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ABSTRACT

Algebra I and General Mathematics courses using tutorial instructional programs under computer control supplemented by "off-line" materials (included in the computer controlled testing) have been developed for a ninth grade student population. This preliminary draft of a teacher's manual for the courses provides outlines of the course content, a reference for locating course content in the computer program, assignment sheets, and a description of the special routines included in the courses. Appended are terminal procedures, recommended "off-line" curriculum materials, a description of the "off-line" algebra program, descriptions of two supplementary drill programs, flowcharts, and a glossary of terms. (EM 011 037 through EM 011 043, EM 011 046, EM 011 047, and EM 011 049 through EM 011 058 are related documents. The technical report on the project is EM 011 050.) (RH)

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COMPUTER ASSISTED INSTRUCTION LABORATORY

COLLEGE OF EDUCATION · CHAMBERS BUILDING

THE PENNSYLVANIA STATE UNIVERSITY · UNIVERSITY PARK, PA.

COMMONWEALTH CAI CONSORTIUM

PRELIMINARY DRAFT

TEACHER'S MANUAL

–ALGEBRA 1–

–GENERAL MATHEMATICS–

Report # R–46

EM 011 054

Note to accompany the Penn State Documents.

In order to have the entire collection of reports generated by the Computer Assisted Instruction Lab. at Penn State University included in the ERIC archives, the ERIC Clearinghouse on Educational Media and Technology was asked by Penn State to input the material. We are therefore including some documents which may be several years old. Also, so that our bibliographic information will conform with Penn State's, we have occasionally changed the title somewhat, or added information that may not be on the title page. Two of the documents in the CARE (Computer Assisted Remedial Education) collection were transferred to ERIC/EC to abstract. They are Report Number R-36 and Report Number R-50.

— Joe McCall: /ERIC/EM

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COMMONWEALTH
CAI
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TEACHER'S MANUAL

–ALGEBRA 1–

–GENERAL MATHEMATICS–

Report # R–46

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FORWARD

Individualized instruction is a means of reaching the major goal of education, an optimum education for every learner. Many innovative projects during the past decade have been directed toward the attainment of this goal with varying degrees of success. Modern technology has an important role to play in providing instruction adapted to individual students.

In the preface of their book, Guidelines for Teaching Mathematics,[1] Johnson and Rising state:

> As mathematics teachers, we face a multitude of decisions every day. We must decide what to teach, how to teach it, and how much emphasis to give certain ideas. We must decide what materials and activities are appropriate for students with different interests, abilities, and goals. In addition, we have to be able to evaluate the effectiveness of our own instruction.

The decisions made by the teacher in a conventional classroom are based on the needs of a group of students. To make decisions based on the needs of five groups of students daily is a demanding task. To make the decisions to meet the needs of each individual within these five groups is impossible.

To individualize instruction, the decisions mentioned by Johnson and Rising must be based on information unique to each individual as the student participates in the learning situation. To provide individualized instruction, the necessary information should be stored so that it is readily available on call. The stored information must also be continually updated as the needs of individuals change. The modern computer has the capabilities required to provide the storage and retrieval demanded by the individualized instruction environment.

The decisions of what to teach and how to teach can be made by competent educators. The instructional material, determined by these decisions, can be programed for presentation at a computer-controlled terminal. As a student progresses through the instructional program, his performance can be analyzed thus providing information to make the decision of what emphasis to place on certain ideas.

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[1] Guidelines for Teaching Mathematics, Johnson, Donovan A., and Rising, Gerald R., 1962, Wadsworth Publishing Company, Inc., Belmont, California.

Freed from making these decisions, the teacher can concentrate on the information that cannot be readily stored in the computer for prescribing instructional materials to supplement the computer-assisted instruction (CAI) program. The computer program will provide the main source of instruction at the student terminal. This instruction will be supplemented by a variety of off-line instructional experiences. The student will be assigned off-line material according to his individual instructional needs. The teacher must assess these needs from data provided by the computer program and by observing and evaluating the student's performance off-line.

This new tool changes the role of the teacher from that of the main source of cognitive information to that of the manager of an instructional environment. In addition to being competent in the subject matter area, the teacher must be able to identify the interests and abilities of each student, know the content of a variety of instructional materials, and be able to prescribe the appropriate materials for each student.

The purpose of the Consortium mathematics project is to test the model, just described, of an individualized instruction environment. Although the main source of instructional material is presented by the CAI program, the success of the students in attaining the behavioral objectives of the course will depend upon the success of the CAI classroom teacher in motivating the students to do their best and in developing a positive attitude on the part of the students towards mathematics.

The purpose of this manual is to aid the teacher to fulfill his role in the CAI classroom.

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CHAPTER 1

CAI COURSE CONTENT

ALGEB

Chapter	Topic
I	Numbers and Set Notation
II	Properties of Equality and Operations
III	Integers: Properties and Operations
IV	Operations with Rational Numbers and Real Numbers
V	Equations, Inequalities and Problem Solving
VI	Linear Systems
VII	Polynomials
VIII	Factoring Polynomials

ALGEB

Chapter 1 — Number and Set Notations

A. Sets

1. Intuitive definition of set
2. Examples of sets
3. Definition of elements of a set
4. Braces used to designate a set
5. Constructing a roster from a rule
6. Recognizing a rule for a roster
7. Definition and recognition of a null set
8. Symbols for the null set, that is { } and $\emptyset$
9. Symbols for "is an element of" (that is, $\in$) and "is not an element of" (that is, $\notin$)
10. Recognizing a well-defined set (optional)

B. Subsets

1. Definition and examples
2. Definition and examples of proper subset
3. Use of symbol for "is a subset of" (that is, $\subset$)
4. Definition and examples of equal sets
5. Classification of sets as finite and infinite

C. Intersection and Union of Sets

1. Definition and examples of the intersection of two sets
2. Symbol for intersection
3. Definition and examples of the union of two sets
4. Symbol for union
5. Disjoint Sets (optional)

D. Order of Operation

1. Presentation of the following as the accepted order:
   a. Work in parentheses
   b. Multiply or divide from left to right
   c. Add or subtract from left to right
2. Problems involving two or more operations

E. Inequalities

1. Reading of symbols listed below
2. Using symbols listed in number sentences

   Symbols: $=$, $>$, $<$, $\leq$, $\geq$

ALGEB

Chapter 1 Numbers and Set Notation

F. Exponents

1. Use of the word "factor"
2. Writing expressions with repeated factors using exponents
3. Writing expressions with exponents using repeated factors
4. Writing exponential expressions for verbal phrases
5. Use of raised dot to indicate multiplication
6. Simplifying a numerical expression containing exponents
7. Evaluating exponential expressions for given values of the variables

G. Open Sentences

1. Definition and recognition of variables in expressions
2. Definition and recognition of an open sentence
3. Definition of domain and solution set
4. Finding a solution given domain and open sentences.
5. Changing easy word sentences into algebraic symbols

H. Graphing on the Number Line

1. Marking off units on the non-negative number line
2. Giving names for the units
3. Use of the word, "coordinate"
4. Graphs as a way to specify sets
   a. Given a set, show the graph
   b. Given a graph, indicate the set
5. Set builder notation

ALGEB

Chapter II — Properties of Equality and Operations

A. Equality Relations

1. Reflexive property: $a = a$
2. Symmetric property: If $a = b$, then $b = a$
3. Transitive property: If $a = b$, and $b = c$, then $a = c$

B. Closure Property

1. Non-verbal introduction
2. Example of closed sets
3. Example of sets that are not closed

C. Commutative Property

1. Commutative properties of addition and of multiplication
2. Does commutative property hold for division and for subtraction
3. Choose the operations that are commutative

D. Associative Property

1. Idea of a binary operation
2. Regrouping numbers
3. Associative properties of addition and of multiplication
4. Drill on associative property

E. Distributive Property

1. Example using ticket sales
2. Substitute variables for numbers
3. Definition of distributive property of multiplication with respect to addition
4. Distributive property for more than three numbers
5. Distributive property of multiplication with respect to subtraction
6. Drill on distributive property

F. Properties of Zero and One

1. The addition property of zero: $a + 0 = a$
2. The multiplication property of zero: $a \cdot 0 = 0$
3. The multiplication property of one: $a \cdot 1 = a$

G. Recognizing Properties

1. Given property, identify example
2. Given example, identify property
3. True-false: statement of properties

ALGEB

Chapter III

Integers:
Properties and Operations

A. Integers on the Number Line

1. Integers to the left of 0
2. Integers which are opposite
3. Positive and negative integers
4. 0, neither positive nor negative
5. Designative the set of integers
6. Indicating subsets of integers
7. Indicating graphs of subsets of integers
8. Indicating the set of integers shown on a graph

B. Order in the Integers

1. Ordering of integers on the number line
2. Ordering of given sets of listed integers
3. Transitive property of inequality
4. Comparison property

C. Absolute Value of Integers

1. Removing absolute value symbols
2. Definition of absolute value
3. Simplifying numerical expressions containing absolute value symbols
4. Solving equations containing absolute value symbols
5. Graphing solution sets for open sentences containing absolute value symbols

D. Adding Integers

1. Addition on a thermometer
2. Addition on the number line
3. Rules for adding integers
4. Practice adding 2 integers horizontally
5. Practice adding 3 or more integers horizontally
6. Practice adding 3 or more integers vertically

E. Addition Properties of Integers

1. Closure
2. Commutative property
3. Associative property
4. Addition of 0
5. Addition property of opposites
6. Opposite of sum

ALGEB

Chapter III — Integers: Properties and Operations

F. Multiplying Integers

1. Multiplication of a positive integer by an integer as a repeated addition
2. Guided discovery of rule of signs for multiplication of a negative integer by an integer
3. Practice on multiplying 2 or more integers
4. Rule of signs for multiplying more than 2 integers
5. Evaluating variable expressions for given values of the variable (optional)

G. Multiplication Properties of Integers

1. Closure
2. Commutative property
3. Associative property
4. Multiplication property of 0
5. Multiplication property of 1
6. Finding the product of several terms

H. Distributive Property

1. Expressing the indicated product as an indicated sum
2. Expressing the indicated sum as an indicated product

I. Subtracting Integers

1. Intuitive approach to subtraction as addition of the opposite
2. Subtraction of integers horizontally
3. Subtraction of integers vertically
4. Solution of sentences of the form

   $x + a = b$, when a and b are integers

J. Combining Like Terms

1. Definition of: term, like terms, unlike terms
2. Simplifying expressions containing like terms

K. Dividing Integers

1. Intuitive approach to rule of signs for division
2. Division of integers giving an integral result
3. Definition of rational number
4. Solution of sentences of the form $ax = b$ when a and b are integers
5. Substituting values and simplifying indicated quotients

ALGEB

Chapter IV — Operations with Rational Numbers and Real Numbers

A. Rational Numbers

1. Introduction: Integers closed under +, -, and ·, but not closed under ÷
2. Definition of a rational number
3. Integers expressed as rational numbers

B. The Density Property

1. How to type fractions on the CRT
2. Extension of the number line to include rational numbers
3. Showing by successive bisections that between any two points on the number line, there is another rational number
4. Definition of density property

C. Equivalent Frantions, formed

1. By multiplying numerator and denominator by the same number
2. By dividing numerator and denominator by the same number

D. Comparing Rational Numbers

1. Rule for comparing rational numbers with like denominators
2. Using equivalent fractions to order two fractions
3. Ordering fractions using <, =, >

E. Properties of Rational Numbers

1. Commutative property of addition
2. Associative property of multiplication
3. Associative property of addition
4. Commutative property of multiplication
5. Distributive property

F. Reciprocals

1. Additive inverse
2. Definition of reciprocal
3. Finding reciprocal of rational numbers and rational expressions
4. Zero has no reciprocal

G. Real Numbers

1. Review of changing fractions to a decimal
2. Terminating, non-terminating, and repeating decimals
3. Definition of set of
   a. Irrational numbers
   b. Real numbers
4. Property of completeness
5. Graphing on the real number line.

ALGEB

Chapter IV — Operations with Rational Numbers and Real Numbers

H. Prime Factorization and Least Common Multiple (LCM)

1. Finding the set of factors of a number
2. Prime numbers
3. Review of how to type multiplication dot
4. Process of finding the prime factorization
5. Prime factorization of algebraic expressions
6. Finding the LCM
7. Relation between LCM and LCD

I. Reducing Fractions

1. Review of reducing fractions
2. Reducing rational expressions
3. Review of equivalent negative fractions

J. Multiplication of Fractions

1. Multiplication of fractions
2. Multiplication of rational expressions

K. Division of Fractions

1. Review of
   a. Multiplication of fractions
   b. Division
   c. Reciprocals
2. Division using concepts of multiplication and reciprocals

L. Addition and Subtraction of Fractions with Like Denominators

1. Adding fractions using the distributive property
2. Rule for adding fractions
3. Subtracting fractions using the distributive property
4. Rule for subtracting fractions

M. Adding Fractions with Unlike Denominators

1. Review of adding fractions
2. Adding rational expressions
   a. Finding LCD
   b. Forming equivalent fractions
   c. Using distributive property to add numerators
   d. Placing sum of numerators over LCD

ALGEB

Chapter V — Equations, Inequalities and Problem Solving

A. Open Phrases

1. Definition of an open phrase
2. Recognizing the English equivalent of an open phrase
3. Writing open phrases for English phrases in the following types of problems:
   a. Value
   b. Consecutive integers
   c. Distance

B. Open Sentences

1. Open and closed mathematical sentences
2. Examples of practical (real world) problems

C. Solution Sets

1. Definition of solution set, root, simple equation
2. Solving equations with a restricted replacement set
3. Definition of identity
4. Solving inequalities with restricted replacement sets
5. Solving open sentences (domain = real numbers)
   a. Addition property of equality
   b. Finding an additive inverse
   c. Multiplication property of equality
   d. Equivalent equations
   e. Solving equations using additive inverses
   f. Solving equations with variables on both sides of the equation
   g. Solving equations using multiplicative inverses
   h. Solving equations using both inverses

D. Verbal Problems

1. Recognizing an operation from its English equivalent
2. Simple word problems
3. Appollo rocket problem
4. More word problems (number, value, consecutive integer, age, distance)

E. Formulas

1. Writing a formula to express a rule
2. Using formulas to solve problems
3. Changing the subject of a formula
   a. Comparison of steps used to those used for solving equations in one variable
4. Review of inverse operations
5. Solving equations in several variables for one of the variables (in terms of the others)

ALGEB

Chapter V — Equations, Inequalities and Problem Solving

F. Inequalities

1. Properties of "is greater than"
   a. Transitive
   b. Addition
   c. Multiplication
2. Solving inequalities
   a. Graph of solutions sets of inequalities
   b. Simplifying inequalities

ALGEB

Chapter VI — Linear Systems

A. The Real Number Plane

1. Ordered pairs of real numbers associated with points
2. Reading ordered pairs and naming points using ordered pairs
3. Terms: X-axis, Y-axis, origin, abacissa, ordinate
4. Properties of quadrants
5. Points on an axis and the origin
6. Plotting points, given ordered pairs

B. Graphs of Linear Systems

1. Linear equations in two variables

   ($Ax + By + C = 0$, where A and B are not both 0)
2. Solution set for an equation in two variables
3. Graph of solution set
   a. Lines parallel to an axis
   b. Lines in general
4. Equivalent equations

C. The Slope-Intercept Form

1. y-form: $y = mx + b$
2. slope = $\frac{\text{change in vertical distance}}{\text{change in horizontal distance}}$
3. Finding slope
   a. Given two points
   b. Given equation
4. Graphing linear equations
5. Parallel lines

D. Writing Equations for Lines, when given

1. Slope and y-intercept
2. Two points
3. One point and parallel line
4. One point and y-intercept
5. Slope and x-intercept
6. x-intercept and y-intercept

E. Systems of Linear Equations

1. Compound sentences using connective "or"
   a. Conditions for the sentence being true
   b. Solution set
   c. Graph
2. Compound sentences using connective "and"
   a. Conditions for the sentence being true
   b. Solution set
3. System of equations
   a. Solution set
   b. Consistent and inconsistent systems

ALGEB

Chapter VI — Linear Systems

F. Solving Systems of Equations

1. Equivalent systems
2. Elimination method
   a. Adding or subtracting
   b. Multiplication required
3. Substitution method

G. Solving Verbal Problems

1. "number" problems
2. "age" problems
3. "rate" problems

ALGEB

Chapter VII — Polynomials

A. Powers

1. Definition and examples
2. Exponential and expanded form
3. Multiplication of powers
4. Division of powers
5. Raising a power to a power
6. Zero as an exponent
7. Negative exponents (optional)

B. Polynomials in one variable

1. Inductive development of definition of a term
2. Formal definition of a term
3. Using terms as building blocks to construct polynomials
4. Definition of polynomials
5. Types of polynomials
6. Ordering polynomials (ascending, descending)
7. Degrees of a polynomial in one variable

C. Operations with Polynomials

1. Addition of polynomials
2. Subtraction of polynomials
   a. Finding the opposite of a polynomial
3. Multiplication of polynomials
   a. Multiplication product compared to the area of a rectangle
4. Division of polynomials
   a. Division by a monomial
   b. Division by a polynomial

ALGEB

Chapter VIII — Factoring Polynomials

A. Common Monomial Factors
   1. Finding the greatest common factor
   2. Factoring out common factors
   3. Polynomial products compared to the area of a rectangle

B. Special Products and Factoring
   1. Squaring binomials
      a. Perfect square trinomial pattern
      b. Short cut for squaring a binomial
   2. Multiplying the sum and difference of two quantities
      a. Product pattern
   3. Factoring perfect square trinomials
      a. Recognizing a perfect square trinomial
   4. Factoring the difference of two squares
      a. Recognizing a difference of two squares
   5. Multiplying binomials by sight

C. Factoring Quadratic Trinomials
   1. Trinomials of the form $ax^2 + bx + c$ $(a = 1)$
      a. Factoring clues: signs and coefficients
      b. Terms of a quadratic trinomial
      c. Random drill on factoring
   2. Trinomials of the form $ax^2 + bx + c$ $(a \neq 1)$
      a. Trial and error approach
      b. Factoring by rewriting the trinomial as a polynomial of four terms

D. Factoring Completely
   1. Reducible and prime polynomials, definition and recognition

E. Solving Quadratic Equations
   1. Factors whose product is zero
   2. Steps for solving quadratic equations

CAI COURSE CONTENT

GENMA

Chapter	Topic
I	Equations
II	Negative Integers
III	Division of Whole Numbers
IV	Decimals
V	Fractions
VI	Ratio and Proportion
VII	Percent
VIII	Formulas
IX	Geometry
X	Measurements
XI	Graphing

GENMA

Chapter I — Equations

A. Number Sentences

1. True
2. False
3. Open
   a. Given the selector set choose the solution
   b. Construct an open sentence given the "parts"
   c. Find the solution for open sentences

B. Equations

1. True equations
2. Solution from a selector set
3. Find the solution of
4. To solve

C. Equivalent Equations of the Form $n + a = b,\ b > a$
$n = b - a$

1. Generalization (subtract same number from both sides)
2. Variable in either member
3. Equations with 3 terms in one member
   i.e., $a + b + n = c$, such that $a, b > o \quad c > a + b$

D. Equivalent Equations of the Form $n - a = b \quad a > o,\ b > a$

1. Generalization (add the same number to both sides)
2. Variable in either member
3. Equations with as many as 4 terms in one member with the coefficient of the variable understood as 1. The operations between the constants are either + or - and the sums, differences, and solutions are always positive integers.

E. Equivalent Equations of the Form $ax = b$ where $a, b \in N$, implies $\underline{a}$ divides $\underline{b}$.

1. Generalization (divide both sides by the same natural number)
2. Solve more using the generalization

F. Solving Equations of the Form $\frac{1}{a} n = b,\ a, b \in N$

1. Given the selector set
2. Use equivalent equations to solve (generalization)
3. Solve more of same using equivalent equation

G. Solving Equations of the Form $\frac{a}{b} n = c,\ a, b, c \in N$, implies $\underline{a}$ divides $\underline{bc}$

1. Use above generalization to solve
2. Drill on multiplicative inverses

GENMA

Chapter II — Negative Integers

A. Number Line

1. "Up and back" language using arrows
2. Negative and positive numbers on the number line
3. Multiples of 10 between [-40, 40]
4. Removal of number line as "crutch"

B. Shortened Notation - Mathematical Symbols

1. Start in positive region
2. Start in negative region
3. Calculating sums and differences of signed numbers whose absolute value < 100

C. Solving Equations with Negative Integers

1. Refresher of previous generalization (subtract from both sides)
2. Solving equations whose solution is > -50, and < 50
3. Solving equations with negative and positive solutions using numbers of larger absolute value

D. Solving Equations by Addition

1. Adding the same variable to both sides
   i.e., $a - n = b$ vs $n - c = d$

E. Football Game--Positive and Negative Numbers

1. Drill in adding signed numbers
   a. Given addends alike so that better students might intuitively "see" multiplication

F. Multiplying Positive and Negative Integers

1. Using vectors to show like addends with ultimate discovery being short-cut of adding
2. Finding products of signed numbers using parentheses to indicate multiplication

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Chapter III — Division of Whole Numbers

A. Methods

1. Repeated subtraction
2. Common division algorithm

GENMA

Chapter IV — Decimals

A. Introduction of Place Value
   1. Use of abacus to show place value
   2. Reading and writing place value; reference to abacus

B. Comparison of Decimals
   1. Equivalent decimals
   2. Finding the largest decimal of a group
   3. Remedial work using abacus

C. Rounding of Decimals

D. Placing Decimals in Value Order

E. Adding Decimals

F. Subtracting Decimals
   1. Using abacus
   2. Inventory

G. Multiplying and Dividing Decimals
   1. Remedial work
   2. Achievement tests

H. Verbal Problems with Decimals
   1. Emphasizing equations
   2. 1st stage (addition and subtraction)
   3. 2nd stage (multiplication and division)
   3. 3rd stage (combination of 1st and 2nd stages)

GENMA

Chapter V

Fractions

A. Equivalent Fractions

1. Geometric representation
2. As parts of a given set
3. Given five elements in a set of equivalent fractions, type the next three elements
4. Using the property of 1 to relate equivalent fractions
5. Use of the lowest terms fraction to name the set
6. Give the lowest terms equivalent fraction for a given fraction
7. Location of points on the number line that name an infinite set of equivalent fractions

B. Number Line

1. Given the whole number scale on top the student labels the number line by halves, thirds, fourths, eights, etc.
2. Type the fraction for various points given on the scale
3. Whole numbers written as rational fractions with different denominators

C. Adding and Subtracting Fractions

1. Adding like fractions on number line (equation context)
2. Subtracting like fractions on number line (equation content)
3. Finding sums and differences of unlike fractions using equivalent fractions

D. Mixed Numbers

1. Solving equations by multiplication
2. Solving equations by division
3. Improper fractions

E. Common Fractions and Decimals

1. Fractions to decimals
2. Decimals to fractions

GENMA

Chapter VI — Ratio and Proportion

A. Establishing Comparisons Between Two Quantities
   1. Definition of ratio as a comparison
   2. Comparing numbers of objects, using displays
   3. Comparing lengths of line segments

B. Expressing Ratios as Fractions

C. Using Ratios to Express Rates

D. Definition of Equivalent Ratios
   1. Associate correct display with given ratio
   2. Demonstration of "property of one" to write equivalent ratios

E. Definition of Proportion
   1. Testing for proportions, using cross products
   2. Solving proportions for the unknown term
   3. Verbal problems involving proportions

GENMA

Chapter VII — Percent

A. Percent, Fractions, and Decimals

1. Writing percent as a fraction (hundredths)
2. Writing percent as a decimal (hundredths)
3. Writing fractions as decimals, percents, ratios

B. Verbal Percent Problems

1. Percent and fractional equivalents
2. Using equations to solve percent problems
   a. Interest
   b. Discount

GENMA

Chapter VIII — Formulas

A. Evaluation Expressions

1. Using of displays for counting
2. Substituting fixed values in variable expressions
   a. Simple single variable expressions
   b. Variable expressions with coefficients and order of operations

B. Developing Formulas by Induction

1. Inductively arrive at a formula given data on the variables
2. Given data for two variables, solve a formula for remaining variables
3. Evaluating formulas, arranging data in tabular form
4. Writing formulas from data given in tabular form
5. Evaluating formulas with second degree terms and factors

GENMA

Chapter IX — Geometry

A. Space Figures
   1. Introduction
   2. Defining and identifying faces, vertices, edges
   3. Constructing three space figures
      a. Tetrahedron
      b. Pentagonal Prism
      c. Square Pyramid
   4. Compiling data from models
      a. Counting faces, edges, vertices
   5. Development of Euler's Formula

B. Plane Figures
   1. Defining and identifying regions (closed areas), meets (vertices) and paths (side segments)
   2. Developing and applying a form of Euler's Formula for plane figures
   3. Properties of plane figures
      a. Inside - outside
      b. Open - closed
      c. Convex - not convex

C. Linear Figures
   1. Defining line, line segment, ray
   2. Property of being infinite

D. Recognizing Figures as Linear, Plane or Space

E. Angles
   1. Naming
   2. Measuring
   3. Drawing
   4. Comparing
   5. Grouping
      a. Acute
      b. Right
      c. Obtuse

F. Perpendicular and Parallel Lines

G. Triangles
   1. Grouping
      a. Right, obtuse, acute
      b. Equilateral, isosceles, scalene
   2. Sum of the angles
   3. Altitudes

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Chapter IX — Geometry

H. Polygons

1. Quadrilaterals
   a. Square
   b. Rectangle
   c. Parallelogram
   d. Trapezoid
2. Pentagon
3. Hexagon

I. Constructions with Compass and Straight Edge

1. Review of circle and arcs for work with compass
2. Copy a given angle
3. Construct a triangle given 3 sides
4. Construct the bisector of a given angle
5. Construct a triangle given 2 sides and the included angle
6. Designs

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Chapter X — Measurement

A. Introduction to Measurement
   1. Types of measurement
   2. Everyday use of measurement
   3. Measuring devices and uses

B. Linear Measure
   1. Unit conversion
      a. Table of linear measures
      b. Equivalent linear measures
   2. Line segments
      a. Measuring
      b. Congruency
   3. Arithmetic operations
      a. Adding the measures of line segments for total length
      b. Converting measurements to
         - mixed units
         - decimal equivalents
         - fractional equivalents
      c. Verbal problems

C. Introduction to the Pythagorean Theorem

D. Area Measure
   1. Unit conversion
      a. Table of area measures
      b. Equivalent area measures
   2. Finding area
      a. Square regions
      b. Rectangular regions
   3. Total area
      a. Rectangular solids

E. Cubic Measures
   1. Table of cubic measures
   2. Equivalent cubic measures
   3. Finding volume of rectangular solids

F. Circles
   1. Circumference
   2. Area

G. Weights and Dry Measures
   1. Table of weights and dry measures
   2. Finding equivalent weight and dry measurements
   3. Verbal problems

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Chapter X — Measurement

H. Time Measure

1. Table of time measures
2. Finding equivalent time measurements
3. Arithmetic operations with time measurements
4. Finding time differences
5. Verbal problems

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Chapter XI — Graphing

A. Introduction to Graphs
   1. Definition and use of a graph (to represent data)
   2. Identifying types of graphs
      a. Picture graph
      b. Bar graph
      c. Line graph
      d. Circle graph

B. Picture Graphs
   1. Use of picture graph to introduce parts of a graph
      a. Title
      b. Legend
      c. Scale as a ratio
   2. Reading a picture graph having a 1:1 scale
      a. Comparison of data by noting length of row
      b. Reading data by counting symbols
   3. Reading a picture graph not having 1:1 scale
      a. Using ratios to condense data
      b. Given a ratio,determine number of symbols needed to represent data and vice-versa
      c. Comparison of data
      d. Using the scale to interpret data

C. Bar Graphs
   1. Introduction to parts
      a. Horizontal scale and units
      b. Vertical scale and units
   2. Reading a bar graph having a unit vertical scale
      a. Comparison of data
      b. Interpretation of data
   3. Reading a bar graph having a vertical scale of multiple units
      a. Reading subdivisions of the vertical scale
      b. Comparison of data
      c. Interpretation of data

D. Line Graphs
   1. Transition from bar to line graph
   2. Discussion of vertical and horizontal scale and units
   3. Reading line graphs
      a. Interpreting data
      b. Comparing data
      c. Noting trend

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Chapter XI — Graphing

E. Circle Graph

1. Review of center and degrees (as percentage) of total circle
2. Use of parts of the circle to represent data
   a. Comparison of data by comparison of areas of circle
   b. Setting up proportions between fraction of data and fraction of circle
   c. Setting up proportions between percent of data and percent of circle
3. Reading a circle graph

F. Symbols of Value Order

1. $<$, $>$, $=$
2. Comparing values
3. Comparing numerical expressions
4. Value order with reference to position on number line

G. Addition Property of Inequality
Solving inequalities of the form

1. $n - a < b, \quad a > 0$
2. $n - a < b, \quad a < 0$

H. Multiplication Property of Inequality

1. Finding the solutions to open inequalities
2. Solving inequalities of the form
   a. $a \cdot n > b, \quad a > 0$
   b. $a \cdot n > b, \quad a < 0$

I. Solving Inequalities

1. Using both the addition and multiplication properties of inequality
2. Defining $\leq$, $\geq$
3. Given a selector set or a number line, choosing a solution set

J. Graphing Inequalities on a Number Line

K. Developing Two-Variable Equations

1. Recognizing patterns
2. Completing tables
3. Developing "rule" from table of two variables

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Chapter XI — Graphing

L. Graphing Ordered Pairs

1. Definition of ordered pairs
2. Writing ordered pairs in the form (x,y) from tables of two variables
3. Introduction of horizontal and vertical axes
4. Plotting points
5. Naming the coordinates, given a point on the coordinate plane
6. Naming the point, given the coordinates on a coordinate plane

M. The Battleship Game

N. Multiplying Signed Numbers

1. Positive x positive = positive
2. Negative x positive = negative
3. Negative x negative = positive
4. Tabling values and plotting points for equations of the form
   a. $x = ay$ where $a = -1$
   b. $x = ay$ where $a < 0$

O. Graphing Linear Equations

1. Developing tables of ordered pairs from a linear equation
2. Recognizing the graph of a given equation
3. Recognizing the equation of a given graph

Chapter II
CAI PROGRAM MATERIAL

The purpose of this chapter is to provide a reference for locating course content in the computer program. In addition, there is information concerning assignments numbers', number of quiz items and criterion on quizzes.

The segment numbers refer to divisions in the computer program. The block numbers represent subdivision of a chapter (see Flowchart 2). The major labels refer to locations in the computer program. The major labels may be used to access topics out of sequence by using the Skip Routine (see Chapter V).[2]

Assignment numbers refer to assignments listed in the assignment sheets (Chapter III). The number of items in a test or quiz and the criterion for each test or quiz are provided to aid the teacher in asscessing individual student performance.

To avoid possible confusion in interpreting characters in the Major Label column, please note the following:

1. the letter "oh" will be type o
2. the number zero will be typed Ø
3. the letter "el" will be typed l
4. the number one will be typed 1

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[2]N.B. The applicable segment must be on a disc accessible by the computer if a label is to be called.

ALGEB - Chapter 1 Numbers and Set Notation

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
1	1	se∅∅1∅	Introduction to Sets-Rule and Roster	1a, 1b	-	-	-	4	*
	2	se∅21∅	Null Sets and the Symbol ε	2a, 2b	-	4	100%	4	75%
10	3	su∅∅∅5	Subsets	3a, 3b	-	4	100%	4	*
	4	su∅3∅∅	Equal Sets and Finite and Infinite Sets	4a, 4b	-	5	100%	5	80%
11	5	un∅∅1∅	Intersection of Sets	5a	-	5	100%	5	*
	6	un∅∅2∅	Union of Sets	6a	-	5	100%	5	*
		algrt	Chapter Review Test						
12		algeb	Chapter Test 1a 19 test items 33 pool items						
13	7	or∅∅1∅	Order of Operations	7a, 7b	-	5	100%	5	80%
14	8	in∅∅1∅	Inequalities	8a, 8b	-	5	100%	5	*

*See appropriate computer listing of the out-quiz for special criterion.

ALGEB - Chapter 1 (Continued)

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
15	9	ex0010	Exponents	9a, 9b	-	4	100%	5	*
	10	ex0030	Exponents and Factors	10a,10b	-	5	100%	5	*
16	11	os0010	Open Sentences	11a,11b	-	5	100%	5	*
	12	os0050	Open Sentences and Phrases	12a,12b	-	4	100%	4	75%
17	13	gr0010	Graphing on the Number Line	13a	-	5	100%	5	*
	14	gr0040	Set-builder Notation	14a	-	5	100%	5	*
18		algeb	Chapter Review Test						
19		algeb	Chapter Test 21 test items 54 pool items						

*See appropriate out-quiz listing for special criterion.

ALGEB - Chapter 2 Properties of Equalities and Operations

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
2	1	eq∅∅1∅	Relations	1a	-	3	100%	3	100%
	2	cl∅∅∅2	Closure	2a	6	4	100%	4	75%
	3	cm∅∅1∅	Commutative Properties	3a, 3b	-	4	100%	5	80%
20	4	as∅∅1∅	Associative Property	4a, 4b	-	4	100%	5	80%
	5	ds∅∅1∅	Distributive Property	5a, 5b	-	4	100%	4	75%
	6	ze∅∅1∅	Properties of Zero and One	6a	-	3	100%	3	100%
	7	rp∅∅1∅	Recognizing Properties	7a	-	-	-	-	-
28		algeb	Chapter Review Test						
29		algeb	Chapter Test 58 test items 27 pool items						

ALGEB - Chapter 3 Integers: Properties and Operations

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
3	1	nu0010	Graphing on the Number Line	1a, 1b	1	5	100%	6	83%
30	2	zl0010	Order on the Number Line	2a, 2b	3	6*	100%	5	80%
	3	zl0080	Properties of Inequalities	3a, 3b	3	-	-	6	83%
31	4	ab0010	Absolute Value (Def. & Examples)	4a, 4b	3	-	-	7	86%
	5	ab0070	Graphing and Solving Open Sentences with Absolute Value	5a	1	-	-	6	83%
32	6	ai0010	Addition of Integers on the Number Line	6a, 6b	3	5*	100%	5	80%
	7	ai0090	Addition of More Than Two Integers Horizontal and Vertically	7a, 7b	-	-	-	5	80%
33	8	ap0010	Addition Properties	8a	3	-	-	6	83%
34	9	mi0010	Multiplication of Two Integers	9a, 9b	-	7*	100%	5	80%
	10	mi0050	Multiplication of More Than Two Integers	10a,10b	-	-	-	5	80%
35	11	mp0010	Multiplication Properties	11a,11b	2	-	-	6	83%
36	12	dp0010	Multiplying with the Distributive Property	12a,12b	-	-	-	3	66%
	13	dp0050	Using the Distributive Property of Factor	13a,13b	-	-	-	4	75%

*Pretest covers two blocks.

ALGEB - Chapter 3 (Continued)

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
37	14	si0010	Subtraction of Integers	14a,14b	3	9*	100%	5	80%
	15	si0050	Vertical Integer Subtraction	15a,15b	-	-	-	7	85%
38	16	ct0010	Combining Like Terms	16a,16b	-	-	-	4	75%
	17	ct0040	Practice Combining Terms	17a,17b	-	-	-	4	75%
39	18	di0010	Division of Integers	18a,18b	4	6	100%	5	80%
	19	di0040	Division of Interers and Rational Numbers	19a,19b	-	-	-	5	80%
103		algeb	Chapter Review Test						
104		algeb	Chapter Test 28 test items 69 pool items						

*Pretest covers two blocks.

ALGEB - Chapter 4 Operations with Rational Numbers and Real Numbers

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
4	1	de0010	Rational Numbers and Density Property	1a, 1b	5	2	100%	4	75%
	2	ra0010	Equivalent Fractions	2a, 2b	4	4	100%	4	75%
	3	sz0010	Comparing Rational Numbers	3a, 3b	3	4	100%	4	75%
40	4	rp0010	Properties of Rational Numbers	4a, 4c*; 4d*	5	2	100%	4	75%
	5	ri0010	Reciprocals	5a, 5b, 5c*; 5d*	5	4	100%	5	80%
41	6	re0010	Rational and Irrational Numbers	6a, 6b	2	-	-	5	80%
	7	re0060	Real Numbers	7a, 7b	3	-	-	7	71%
	8	pf0010	Prime Factorization	8a, 8b	3	4	100%	3	66%
	9	pf0070	Least Common Multiple	9a, 9b	2	-	-	4	75%
42	10	mr0010	Reduction of Rational Numbers	10a,10b	3	4	100%	5	80%
	11	mr0090	Multiplication of Fractions	11a,11b 11c*	3	3	100%	5	80%
	12	dr0030	Division of Fractions	12a,12b	5	3	100%	5	80%
	13	as0020	Addition and Subtraction of Fractions with Like Denominators	13a,13b	5	4	100%	6	66%
	14	ad0025	Addition of Fractions with Unlike Denom.	14a,14b	10	4	100%	6	66%
48		algeb	Chapter Review Test						
49		algeb	Chapter Test 24 test items 66 pool items						

*Remedial assignment given on basis of performance on preskill.

ALGEB - Chapter 5 Equations, Inequalities, and Problem Solving

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
5	1	op0120	Open Phrases	1a, 1b	22	6*	100%	5	80%
	2	op0400	Value, Consecutive Integer, and Distance Problems	2a, 2b	1	-	-	5	80%
50	3	os0100	Open Sentences	3a, 3b	-	3	100%	5	80%
51	4	ss0030	Solution Sets	4a	5	5	100%	5	80%
	5	ss0060	Solving Inequalities	5a, 5b	7	5	100%	5	80%
	6	io0020	Solving Open Sentences Using Additive Inverses	6a, 6b	4	-	-	4	75%
	7	io0040	Solving Open Sentences Using Multiplication Inverses, Equivalent Equations	7a, 7b	4	4	100%	6	83%
52	8	sa0010	Solving Equations Using Additive Inverses	8a, 8b	8	4	100%	5	80%
	9	sa0050	Solving Equations with Variables on Both Sides of the Equation	9a, 9b	-	4	100%	5	60%
	10	sm0010	Solving Equations Using Multiplicative Inverses	10a,10b	10	4	100%	5	80%
	11	sm0050	Using Multiplicative Inverse to Solve Equations when the Coefficient of the Variable is not an Integer	11a,11b	3	4	100%	5	80%

*Pretest covers two blocks.

ALGEB - Chapter 5 (Continued)

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
53	12	sb0100	Solving Equations Using Additive and Multiplicative Inverses	12a,12b*	-	4	100%	-	-
	13	sb0300	Solving Equations Using Inverses (con't.)	13a,13b	2	4	100%	6	66%
54	14	sv010f	Simple Word Problems	14a	5	-	-	4	75%
	15	sv0020	Word and Value Problems	15a	-	-	-	-	-
	16	sv0090	Consecutive Integer and Age Problems	16a	4	-	-	-	-
	17	sv0160	Distance Problems	17a	-	-	-	-	-
55	18	fm0010	Writing Formulas	18a	-	4	100%	5	60%
	19	fm20d1	Using Formulas	19a	-	4	100%	5	75%
	20	fm0040	Solving Formulas	20a	-	4	100%	-	-
	21	fm0070	Solving Formulas (con't.)	21a	-	3	100%	5	60%
56	22	in0010	Recognizing Inequalities	22a,22b	-	-	-	5	60%
	23	in0040	Solving Inequalities	23a,23b	4	4	100%	5	80%
58		algeb	Chapter Review Test						
59		algeb	Chapter Test 21 test items 54 pool items						

*Assignment 12b is not given on-line. Use at your discretion.

ALGEB - Chapter 6 Linear Systems

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
6	1	gcØØ1Ø	The Real Number Plane	1a, 1b	-	10	*	10	60%
	2	geØØ1Ø	Graphs of Linear Systems	2a, 3a, 3b	-	-	-	4	75%
	3	geØØ5Ø	Graphing Linear Equations	4a	-	-	-	7	71%
60	4	gfØØ1Ø	Slope-Intercept Form	5a	-	-	-	5	60%
	5	gfØØ3Ø	Slope of a Line	6a, 7a 8a	-	-	-	-	-
	6	gfØØ5Ø	Using the Slope-Intercept Form	9a,10a	-	-	-	9	66%
61	7	ghØØ1Ø	Writing Equations of Lines	11a	-	-	-	4	75%
	8	ghØØ3Ø	Writing Equations of Lines (Part 2)	12a	-	-	-	7	57%
	9	gjØØ15	Compound Sentences	13a,14a	9	-	-	4	75%
	10	gjØØ35	Solution Sets of Compound Sentences	15a,16a, 17a	-	-	-	-	-
	11	gjØØ5Ø	Consistent and Inconsistent Systems	18a	-	-	-	8	62%

*6 of 1st. 8; both of last 2.

ALGEB - Chapter 6 (Continued)

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
62		un0020	Union of Sets: Review for Block 9 Preskills	13b*	-	-	-	-	-
		un0000	Intersection of Sets: Review for Block 9 Preskills	13c*	-	-	-	-	-
63	12	gk0010	Equivalent Systems of Equations; Solving Systems of Equations	19a	-	-	-	4	75%
	13	gk0030	Solving Systems of Equations by the Elimination Method (after multiplication)	20a,20b	-	-	-	4	75%
	14	gk0040	Solving Systems of Equations by the Substitution Method	21a	-	-	-	4	75%
64	15	gm0010	Solving Verbal Problems	22a	-	-	-	4	75%
68		algeb	Chapter Review Test						
69		algeb	Chapter Test 20 test items 46 pool items						
			NOTE: There are some "c" assignments on the Algeb Chapter 6 Assignment Sheet which are not given to the students in the course. These assignments (except 13c) are more difficult and should be used at the discretion of the teacher.						
			*These assignments are actually given in Algeb-61 before the transfer is made to Algeb-62 for the review.						

ALGEB - Chapter 7 Polynomials

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
70	1	pa00 3 0	Multiplication of Powers	1a, 2a, 2b	4	5	last 4 correct	5	80%
	2	pb00 1 0	Division of Powers	3a, 4a, 4b	-	4	100%	5	60%
71	3	pc00 1 0	Powers of Powers	5a, 6a, 6b	-	4	100%	5	60%
	4	pd00 1 0	Zero Exponents (Negative Exponents - Optional)	7a, 8a*	-	3	100%	3	66%
72	5	pe00 1 0	Terms	9a	-	5	100%	5	**
	6	pe00 3 0	Polynomials	10a	-	5	100%	5	**
	7	pe00 7a	Types of Polynomials	11a,11b	-	4	100%	4	75%
73	8	pf00 2 0, pp00 1 0-pp00 3 0	Ordering Polynomials	12a,13a	3	4	100%	4	75%
	9	pf2 0 h	Degree of Polynomials	14a,14b	-	4	100%	4	75%
74	10	pq000 1	Addition of Polynomials	15a,16a, 16b	5	5	80%	5	80%
	11	ph000 1	Subtration of Polynomials	17a,18a, 18b	5	5	100%	6	66%
	12	qa00 1 0	Multiplication: (Monomial) (Polynomial)	19a,19b	4	4	75%	4	75%

*Assignment 8a is an optional material in this block.
**See appropriate out-quiz listing for special criterion.

ALGEB - Chapter 7 (Continued)

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
75	13	pkØØØ1	Multiplication: (Polynomial) (Polynomial) (1 Variable)	20a,20b	3	4	100%	4	50%
	14	pkØØ5Ø	Multiplication: (Polynomial) (Polynomial) (Several Variables)	21a,21b	4	5	100%	4	75%
76	15	pmØØØ1	Division: (Polynomial) (Monomial)	22a,22b	3	3	100%	5	60%
	16	pmØØ3Ø	Division: (Polynomial) (Polynomial)	23a,23b	2	4	100%	4	75%
78		algeb	Chapter Review Test						
79		algeb	Chapter Test - 20 test items 53 pool items						

ALGEB - Chapter 8 Factoring Polynomials

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
80	1	qa3Øc	Finding the Greatest Common Factor	1a	3	4	100%	4	75%
	2	qaØØ3Ø	Factoring out the GCF	2a, 3a 3b	-	5	100%	6	66%
	3	qbØØ1Ø	Squaring Binomials	4a, 5a, 5b	3	4	100%	6	66%
	4	qbØØ5Ø	Multiplying the Sum and Difference of Two Quantities	6a, 6b	-	4	100%	6	50%
81	5	qcØØ1Ø	Factoring Perfect Square Trinomials	7a, 8a, 8b	5	4	100%	6	66%
	6	qdØØ1Ø	Factoring the Difference of Two Squares	9a,10a, 10b	3	4	100%	6	66%
82	7	qeØØ1Ø	Multiplying Binomials By Sight	11a,12a, 12b	6	-	-	6	66%
	8	qfØØ1Ø	Factoring Quadratic Trinomials $ax^2 + bx + c$ (a=1)	13a,14a, 15a,15b	-	6	100%	6	66%
83	9	ghØØ1Ø	Factoring Quadratic Trinomials $ax^2 + bx + c$ ($a \neq 1$)	16a,17a, 18a,18b	6	-	-	5	60%
	10	qjØØ2Ø	Factoring Completely	19a,20a, 21a,21b	4	5	100%	4	50%
84	11	qkØØ1Ø	Solving Quadratic Equations	22a,23a, 23b	10	6	100%	6	66%
88		algeb	Chapter Review Test						
89		algeb	Chapter test 21 test items 62 pool items						

GENMA - Chapter 1 Equations

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
1		e00010	Terminal Usage						
	1	e00080	Open Sentences	1a, 1b	-	-	-	5	80%
	2	e00220	Solving Equations	2a, 2b	-	-	-	5	80%
	3	e00360	Equivalent Equations	3a, 3b	-	-	-	5	80%
	4	e00500	Solving Equations by Addition	4a, 4b	-	5	100%	5	80%
	5	e00590	Solving Equations by Addition	5a, 5b	-	5	100%	5	100%
	6	e00650	Solving Equations by Subtraction	6a	-	5	100%	5	80%
	7	e00740	Solving Equations by Division	7a, 7b	-	4	100%	5	80%
10	8	e00880	Equations with Rational Coefficients	8a, 8b	-	4	100%	5	80%
	9	e00990	Solving Equations Using Reciprocals	9a, 9b	-	4	100%	5	80%
18		genma	Chapter Review Test						
19		genma	Chapter Test 20 test items 50 pool items						

GENMA - Chapter 2 Negative Integers

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
2	1	nØØ1Ø	Using the Number Line	1a, 1b	-	6	83%	6	83%
	2	nØ11Ø	Shortened Notation	2a, 2b	-	5	100%	5	80%
	3	nØ158	The Number Line from -40 to 40	3a, 3b	-	5	100%	6	83%
20	4	nØ19Ø	Using + and - Notation	4a, 4b	-	6	83%	6	83%
	5	nØ24Ø	Number Line (larger numbers)	5a, 5b	-	5	80%	5	80%
	6	nØ27Ø	Equations with Negative Solutions	6a, 6b	-	6	83%	6	83%
21	7	nØ34Ø	Equations with Solutions between -50 and 50	7a	-	6	83%	5	80%
	8	nØ44Ø	Solving Equations by Addition	8a	-	6	83%	6	83%
22	9	nØ65Ø	Football Game-Positive and Negative Numbers	9a, 9b	-	-	-	5	80%
	10	nØ748	Combining Signed Numbers	10a,10b	-	5	100%	5	80%
	11	nØ77Ø	Multiplying Signed Numbers	11a,11b	-	6	100%	6	83%
28		genma	Chapter Review Test						
29		genma	Chapter Test 27 test items 45 pool items						

GENMA - Chapter 3 Division of Whole Numbers

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
3	1	dwØØ1Ø	Division	1a, 1b 2a	-	-	-	-	-

GENMA - Chapter 4 Decimals

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
4	1	dØØØ1Ø	Introduction to Decimals	1a, 1b	-	4	100%	4	100%
	2	dØØØ5Ø	Use of the Abacus	2a, 2b*	-	-	-	-	-
	3	dØØØ7Ø	Reading Decimals	3a, 3b	-	4	100%	4	75%
	4	dØØØ8Ø	Equivalent Decimals	4a, 4b	-	4	100%	4	75%
40	5	dØØØ9Ø	Rounding and Comparing Decimals	5a, 5b	-	4	100%	4	75%
	6	dØØ11Ø	Adding Decimals	6a, 6b	-	5	100%	5	80%
	7	dØØ121	Subtracting Decimals	7a, 7b	-	5	100%	5	80%
41	8	dØØ141	Multiplying Decimals	8a, 8b	-	5	100%	4	75%
	9	dØØ151	Dividing Decimals	9a, 9b	-	5	100%	5	80%
	10	dØØ16Ø	Verbal Problems	10a, 10b	-	-	-	3	100%
48		genma	Chapter Review Test						
49		genma	Chapter Test 30 test items 56 pool items						

*Assignment 2b is not given on-line.
Use at your discretion.

GENMA - Chapter 5 Fractions

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
5	1	r00001	Fractional Parts of a Whole	1a, 1b	-	-	-	5	80%
	2	r00040	Equivalent Fractions	2a, 2b	-	5	100%	4	75%
	3	r00070	Reducing Fractions to Lowest Terms	3a, 3b	-	4*	100%	4	75%
	4	r00110	Reducing Fractions	4a, 4b	-	-	-	4	75%
50	5	r00120	Fractions on a Number Line	5a, 5b	-	4	100%	5	80%
	6	r00200	Fractions that are Whole Numbers	6a, 6b	-	5	100%	6	83%
51	7	r00230	Addition and Subtraction of Fractions with Like Denominators	7a, 7b	-	4*	100%	4	75%
	8	r00270	Addition and Subtraction of Fractions with Unlike Denominators	8a, 8b	-	-	-	4	75%
	9	r00360	Improper Fractions and Mixed Numbers	9a, 9b	-	4	100%	5	80%
52	10	r00430	Adding Mixed Numbers	10a,10b	-	3	100%	4	75%
	11	r00480	Subtracting Mixed Numbers	11a,11b	-	3	100%	3	66%
53	12	r00500	Multiplying Fractions	12a,12b	-	4*	100%	3	66%
	13	r00540	Multiplying Whole Numbers and Fractions	13a,13b	-	-	-	3	100%

*Pretest covers two blocks.

GENMA - Chapter 5 (Continued)

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
54	14	rØØ56Ø	Multiplying Mixed Numbers	14a,14b	-	3	100%	3	66%
	15	rØØ59Ø	Dividing Fractions	15a,15b	8	4*	100%	4	75%
	16	rØØ62Ø	Dividing Mixed Numbers	16a,16b	-	-	-	4	75%
55	17	rØØ64Ø	Fraction-Decimal Conversion	17a,17b	-	-	-	4	75%
	18	rØØ66Ø	Fraction-Decimal Conversion (Con't.)	18a,18b	-	4	100%	4	75%
58		genma	Chapter Review Test						
59		genma	Chapter Test 35 test items 62 pool items						

*Pretest covers two blocks.

GENMA - Chapter 6 Ratio and Proportion

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
6	1	rp0010	Ratio as Comparisons	1a	-	4	100%	4	75%
	2	rp0040	Ratios in Fractional Form and as Rates	2a, 2b	-	5	100%	5	80%
60	3	rp0080	Equivalent Ratios	3a	-	4	100%	4	75%
	4	rp0130	Cross Products and Proportions	4a	-	3	100%	3	100%
	5	rp0150	Solving Proportions	5a	-	-	-	4	75%
61	6	rp0160	Verbal Problems	6a	-	4*	100%	-	-
	7	rp0170	Verbal Problems (Con't.)	7a	-	-	-	-	-
68		genma	Chapter Review Test						
69		genma	Chapter Test 16 test items 32 pool items						

*Pretest covers two blocks.

GENMA - Chapter 7 Percent

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
7	1	p0001Ø	Changing Common Fractions to Decimals and Percent	1a, 1b	-	-	-	6	83%
	2	p0003Ø	Changing Common Fractions to Percent	2a, 2b	-	6	100%	6	66%
	3	p0006Ø	Changing Percent to Common Fractions	3a, 3b	-	2	100%	3	66%
	4	p0007Ø	Writing Problem Solutions as a Fraction, Decimal, Percent, and Ratio	4a	-	4	100%	4	100%
70	5	p0011Ø	"Short Stories," Percent	5a, 5b*	-	-	-	-	-
	6	p0014Ø	Fractional Percent	6a	-	3	100%	3	100%
	7	p0015Ø	Verbal Problems	7a, 7b*	-	-	-	-	-
71	8	p0019Ø	Using Equations to Solve Percent Problems	8a, 8b	-	4	100%	4	75%
	9	p0023Ø	Verbal Problems	9a, 9b*	-	-	-	-	-
78		genma	Chapter Review Test						
79		genma	Chapter Test 20 test items 36 pool items						

*Assignments 5b, 7b, and 9b are not given on-line. Use at your discretion.

GENMA - Chapter 8 Formulas

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
8	1	f00010-f00030	Substitution into Formulas	1a, 1b	-	4	100%	4	75%
	2	f00170-f00220	Building Formulas from Given Numerical Relations	2a	-	4	100%	4	75%
80	3	f00040-f00110, f00130	Solving for Different Variables of Formulas	3a, 3b	-	5*	100%	5	80%
	4	f00120, f00140-f00160	Completing Numerical Tables Using Formulas	4a	-	-	-	4	75%
	**5	f00240-f00280	Working with Second Degree Formulas	5a, 5b	4	3	100%	3	66%
88		genma	Chapter Review Test						
89		genma	Chapter Test 15 test items 27 pool items						

*Pretest covers two blocks.

**Only students who pass the out-quiz for Block 4 on the first attempt will get Block 5.

GENMA - Chapter 9 Geometry

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
9	1	ga0010	Introduction to Space Figures Cylinder Rectangular Prism-Face, Vertex, Edge	1a, 1b	-	4	100%	4	75%
	2	ga0031	Constructing Three Space Figures Tetrahedron Pentagonal Prism Square Pyramid	2a	-	-	-	-	-
	3	ga0060	Collecting Data from Models Development of Euler's Formula	3a, 3b	-	3	100%	3	66%
90	4	ga0080	Plane Figures and Euler's Formula	4a, 4b	-	-	-	5	80%
	5	ga0100	Properties of Plane Figures Inside-Outside Open-Closed Convex-Not Convex	5a, 5b	-	4	100%	4	75%
	6	ga0140	Properties of Linear Figures and Recognizing Linear, Plane and Space Figures	6a	-	5	100%	-	-

GENMA - Chapter 9 (Continued)

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
91	7	gb0010	Naming and Measuring Angles	7a, 7b	-	4	100%	4	75%
	8	gb0020	Grouping Angles Perpendicular and Parallel Lines	8a, 8b, 8c	-	5	100%	5	60%
	9	gb0030	Grouping Triangles	9a, 9b	-	4	100%	4	75%
	10	gb0040	Angles of a Triangle Altitudes of a Triangle	10a,10b	-	-	-	5	60%
	11	gb0050	Polygons	11a,11b	-	5	100%	8	62%
	12	gb0060	Constructions	12a,13a, 14a	-	-	-	-	-
98		genma	Chapter Review Test						
99		genma	Chapter Test 23 test items 61 pool items						

GENMA - Chapter 10 Measurement

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
101	1	mØØØ1Ø	Introduction to Measurements	1a	-	-	-	-	-
	2	mØØØ4Ø	Linear Conversions	2a	-	-	-	-	-
	3	mØØØ49-mØØØ7Ø	Working with Lengths	3a, 4a	-	-	-	-	-
102	4	gcØØ1Ø-gcØØ2Ø	Triangles and the Pythagorean Theorem	5a	-	-	-	-	-
	5	mØØØ71	Area Conversion	6a	-	-	-	-	-
	6	mØØØ73	Area of a Rectangle	7a	-	-	-	-	-
	7	mØØØ8Ø	Rectangular Solids and Total Surface Area	8a	-	-	-	-	-
	8	mØØØ9Ø	Cubic Measure	9a,10a	-	-	-	-	-
	9	mØØ11Ø	Circles	11a,12a	-	-	-	-	-
103	10	mØØ14Ø	Weight and Dry Measure	13a,14a	-	-	-	-	-
	11	mØØ16Ø	Time Measure	15a,16a	-	-	-	-	-
108		genma	Chapter Review Test						
109		genma	Chapter Test 23 test items 50 pool items						

GENMA - Chapter 11 Graphing

Segment	Block Number	Label	Topic	Assignment	Preskills	Pretest		Out-Quiz	
					Number of Questions	Number of Questions	Criterion	Number of Questions	Criterion
110	1	pl0010	Picture Graphs	1a	-	-	-	-	-
	2	pl0050	Bar Graphs	2a	-	-	-	-	-
	3	pl0080	Line Graphs	3a	-	-	-	-	-
	4	pl0100	Circle Graphs	4a	-	-	-	-	-
111	5	pl0120	Comparing Numbers	5a	-	-	-	5	80%
	6	pl0150	Addition Property of Inequality	6a	-	-	-	5	80%
	7	pl0180	Multiplication Property of Inequality	7a	-	-	-	4	75%
	8	pl0220	Graphing Inequalities	-	-	-	-	5	80%
	9	pl0250	Using and Developing Rules	8a	-	-	-	3	66%
112	10	pl0290	Graphing Ordered Pairs	9a	-	-	-	5	60%
	11	pl0320	Battleship	10a	-	-	-	5	80%
	12	pl0350	Multiplication of Negative Signs	11a	-	-	-	7	71%
	13	pl0390	Graphing Linear Equations	12a	-	-	-	3	66%
118		genma	Chapter Review Test						
119		genma	Chapter Test 20 test items 59 pool items						

CHAPTER III
ASSIGNMENT SHEETS

Each student is to receive an assignment sheet at the beginning of each chapter. The on-line program specifies an assignment number when a student is signed off. The number contains a digit and a letter. In most cases the digit represents a block number. The letter specifies the level of assignment. The A assignment represents practice on the instruction received in the block, and is made on the first iteration of a block. If the out-quiz is failed, assignment B is given. Assignment C is made by the teacher when the student is judged to need additional work, either remedial or supplemental.

The supplemental activities are identified on a set of cards. The teacher is expected to select an activity appropriate for a student and refer the student to a card in the set by number. The student should enter the card number in column C of the assignment sheet. When an assignment has been completed, the student should enter the date in the "Date Completed" column.

Name: _____ Student No.: _____

Period: _____

ALGEB Assignments

Chapter 1

A and B assignments are on worksheets or are from:

your text, ALGEBRA A MODERN APPROACH.
A PROGRAM in CONTEMPORARY ALGEBRA (PCA).
ALGEBRA SKILLS KIT (ASK).
HAYES DITTOS (HD).

C assignments will be made by your teacher.

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	pp.4-6 (1-1) #1a-e, 3a-b, 4a-f, 5a-f, 9a-b, 10a-b, 12a-c	PCA Book 1, p.43 Frames 27-33 HD 9-1, p.1 7-1, p.1, p.5		
2	2	pp.4-6 (1-1) #2a-f, 6a-f, 7a-f, 8a-c pp.7-9 (1-2) #10a-c,12a-e	PCA Book 1, p.44 Frames 34-37		
3	3	pp.7-9 (1-2) All exercises except #3,10, 12 p.10 (1-3) #1a-e, 2a-d	PCA Book 1, p.50 Frames 58-64 HD 7-1, p.3 #1-8		
4	4	p.14 (1-5) #1a-e, 2a-e, 3a-e p.17 (1-6) #1, 2, 3a-k	PCA Book 1, p.48 Frames 48-50 HD 9-1, p.5 #1, 2, 3 7-1, p.2		

ALGEB Assigt.
Chapter 1

Block Number	Assigt. Number	A	B	C	Date Completed
5	5	PCA Book 1, p.52 Frames 66-83	See your teacher.		
6	6	PCA Book 1, p.56 Frames 84-101 HD 7-1, p.3 #10-14	See your teacher.		
7	7	p.22 (1-8) #1-10 pp.22-23 (1-9) #1-12 p.23 (1-10) #1-12 p.23 (1-11) #1-6	PCA Book 1, p.108 Frames 40-68 ASK IIIa, 1a; IIIb, 1b, #1-4; IIIa, 2a HD 9-1, p.6, p.9, 7-1, p.19		
8	8	pp.24-25 (1-12) #1-18 p.25 (1-13) #1-20	PCA Book 2, p.115 Frames 21-24 ASK IVa, 7a, #7-14 HD 9-1, p.10		
9	9	p.34 (1-19) #1a-h, 2a-1	PCA Book 1, p.104 Frames 19-26 ASK Va, 1a HD Alg. p.3 #1-13		

ALGEB Assigt.
Chapter 1

Block Number	Assigt. Number	A	B	C	Date Completed
10	10	pp.34-35(1-19) #3a-1 p.35 (1-20) #1-14	PCA Book 1, p.105 Frames 28-33 ASK Va, 2a HD Alg, p.3 #14-20		
11	11	pp.27-28(1-14) #1a-d, 2a-d, 3a-j p.28 (1-15) #1a-h, 2a-e	PCA Book 1, p.88 Frames 73-95 HD 9-1, p.14 9-1, p.15 even problems Alg, p.4 even problems		
12	12	pp.35-36(1-21) #2a-h pp.38-39(1-23) #1a-e, 3a-j, 4a-f, 5a-f	PCA Book 2, p.62 Frames 98-115 HD 9-1, p.15 odd problems Alg, p.4 odd problems		
13	13	pp.30-31(1-16) #1a-p	See your teacher.		
14	14	p.33 (1-18) #1a-j, 2a-j	See your teacher.		

Name: _____ Student No.: _____

Period: _____

ALGEB Assignments

Chapter 2

All A assignments are in your text, ALGEBRA A MODERN APPROACH, or on worksheets.

B assignments are from: A PROGRAM in CONTEMPORARY ALGEBRA (PCA).
ALGEBRA SKILLS KIT (ASK).
HAYES DITTOS (HD).

C assignments will be made by your teacher.

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	Worksheets Assignment #1	See your teacher.		
2	2	pp.57-58(2-2) #1-3	See your teacher.		
3	3	pp.59-60(2-3) #1a-f, 2, 3 pp.60-61(2-4) #1, 3 p.62 (2-5) #1	HD 7-1, p.16		
4	4	p.64 (2-6) #6-10 Read examples 2 and 3 on p.66. pp.66-68(2-7) #1, 2, 9	HD 7-1, p.20		
5	5	pp.71-72(2-8) #1, 4 p.73 (2-10) #1-8	HD 7-1, p.23		

ALGEB Assigt.
Chapter 2

Block Number	Assigt. Number	A	B	C	Date Completed
6	6	p.75 (2-11) #1-3 pp.75-77(2-12) #1, 8a-c	See your teacher.		
7	7	Worksheet Assignment #7	No assignment		

Name: _____ Student No.: _____

Period: _____

ALGEB Assignments

Chapter 3

All A assignments are in your text, ALGEBRA A MODERN APPROACH, or on worksheets.

B assignments are from: A PROGRAM in CONTEMPORARY ALGEBRA (PCA).
ALGEBRA SKILLS KIT (ASK).
HAYES DITTOS (HD).

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	p.93 (3-1) #1a-f pp.93-94(3-2) #1a-d p.96 (3-4) #2a-f, 3a-f, 4a-e	PCA Book 1, p.76 Frames 35-41 ASK Ia,1a HD 8-1, p.6 #1,2		
2	2	pp.95-96(3-3) #1a-1, 2a-i p.98 (3-5) #1a-f p.98 (3-6) #1a-f	PCA Book 1, p.163 Frames 127-139		
3	3	p.98 (3-6) #2, 3a-h, 4a-b pp.100-101 (3-7) #2, 3 pp.101-102 (3-8) #2-9	PCA Book 2, p.135 Frames 98-104		

ALGEB Assigt.
Chapter 3

Block Number	Assigt. Number	A	B	C	Date Completed
4	4	p.103 (3-9) #1a-h, 2a-j p.104 (3-10) #1a-f	PCA Book 2, p.43 Frames 16-20 ASK Ia, 2a		
5	5	pp.103-104 (3-9) #3a-h p.104 (3-10) #2a-d, 3a-b, 4a-f	See your teacher.		
6	6	p.106 (3-11) #1a, 1c, 2a-c, 3a-h, 4a, 5a-d	PCA Book 2, p.5 Frames 19-40, 92,94 ASK Ia,4a; Ia,5a; Ib,5b HD 8-1, p.7 9-1, p.22 #1-12 9-1, p.23		
7	7	pp.107-108 (3-12) #1a-f, 2a-c, 3a-d p.108 (3-13) #3a-c pp.111-112 (3-14) #1a-e, 3a-e pp.112-113 (3-15) #5,6	ASK Ia,6a; Ib,6b HD 7-2, p.24,p.25 9-1, p.22 #13-24 9-1, p.23		

ALGEB Assigt.
Chapter 3

Block Number	Assigt. Number	A	B	C	Date Completed
8	8	pp.111-112 (3-14) #2a-f pp.112-113 (3-15) #2a-d, 3a-c, 7	See your teacher.		
9	9	p.117 (3-16) #1a-d, 2a-l	PCA Book 2, p.11 Frames 41-49, 52-55, 65-66, 74-77 HD 8-1, p.11 #9-16 9-1, p.26 #6-21 Alg, p.9 top #1-27 ASK Ia, 10a; Ia, 11a		
10	10	p.117 (3-16) #2m-x p.118 (3-17) #1a-l, 2a-e	HD 8-1, p.11 #9-16 9-1, p.26 #6-21 Alg, p.9 bottom #1-12 ASK Ia, 12a; Ib, 12b		
11	11	p.120 (3-18) #1a-l	HD 9-1, p.29		
12	12	p.120 (3-18) #2a-l	PCA Book 2, p.21 Frames 78-81		
13	13	p.121 (3-19) #1a-l, 2a-h	HD 9-1, p.27		

ALGEB Assigt.
Chapter 3

Block Number	Assigt. Number	A	B	C	Date Completed
14	14	pp.123-124 (3-20) #2a-j, 3a-k, 4a-e pp.124-125 (3-21) #1-6	PCA Book 2,p.30 Frames 112-129 ASK Ia,7a; Ib,7b; Ia,8a; Ib,8b HD 8-1, p.9		
15	15	p.123 (3-20) #1a-k pp.124-125 (3-21) #8a-f p.126 (3-22) #3a-h p.126 (3-23) #5a-d,6c-f	HD Alg, p.8		
16	16	pp.123-124 (3-20) #11-o, 2k-x pp.124-125 (3-21) #9a-f	PCA Book 1, p.93 Frames 97-104 ASK IIIa, 10a HD Alg, p.11 #1-20		
17	17	p.121 (3-19) #3a-h	HD 9-1, p.28 Alg, p.11 #21-35 ASK IIIa, 11a; IIIa, 12a; IIIa, 13a; IIIa, 15a		

ALGEB Assigt.
Chapter 3

Block Number	Assigt. Number	A	B	C	Date Completed
18	18	p.130 (3-25) #1a-1, 2a-f	PCA Book 2, p.34 Frames 130-147 HD 8-1, p.12 #1-13 ASK Ia, 13a; Ia, 14a		
19	19	p.130 (3-25) #4a-i p.131 (3-26) #1a-m, 2a-m	PCA Book 2, p.22 Frames 84-89 ASK IIIa, 7a; IIIb, 7b; IIIa, 8a; IIIb, 8b; IIIa, 9a; IIIb, 9b HD 8-1, p.17 Alg, p.10		

Name: _____ Student No.: _____

Period: _____

ALGEB Assignments

Chapter 4

All A assignments are in your text, ALGEBRA A MODERN APPROACH, or on worksheets
B, C, and D assignments are from: A PROGRAM in CONTEMPORARY ALGEBRA (PCA).
ALGEBRA SKILLS KIT (ASK).
HAYES DITTOS (HD).
SKILLS AND PATTERNS (SP).

Block Number	Assigt. Number	A	B	C,D	Date Completed
1	1	pp.149-150 (4-1) #1-8	PCA Book 1, p.12 Frames 56-74		
2	2	pp.153-154 (4-3) #1-8 p.175 (Rev.Ex.) #1	ASK IIa, 8a #1-6		
3	3	p.156 (4-4) #1-3	HD 9-2, p.8		
4	4	p.175 (Rev.Ex.) #3,5 pp.81-82 (Rev.Ex.) #6-8	See your teacher.	4C SP Fractions: Addition and Subtraction p.14, #1-6 p.16-17,#1,2 4D SP Fractions: Multiplication and Division p.17, #1 p.31, #6	
5	5	pp.150-151 (4-2a) #1,2 p.152(4-2b) #1-8	ASK IIa, 3a	5C ASK Ia, 4a Ia, 5a 5D ASK Ia,10a Ia,11a	

ALGEB Assigt.
Chapter 4

Block Number	Assigt. Number	A	B	C,D	Date Completed
6	6	pp.159-160 (4-5) #1, 2	PCA Book 1, p.16 Frames 75-109 Book 1, p.38 Frames 10-20		
7	7	pp.160-161 (4-6) #1-4	PCA Book 1, p.81 Frames 51-66		
8	8	pp.163-164 (4-8) #1a-1,2a-e	HD 8-2, p.12 #1,2 9-2, p.2 9-2, p.3 #1-12		
9	9	pp.163-164 (4-8) #2f-i, 3a-f	HD 7-2, p.2 7-5, p.5		
10	10	p.166 (4-9) #1-24	ASK Va, 9a Va, 13a		
11	11	p.167 (4-10) #1-20	ASK VIIa, 6a VIIb, 6b HD Alg, p.15 #1,2,3,7,8,9	11C ASK IIa, 2a	
12	12	p.168 (4-11) #1-15	ASK VIIa, 9a VIIb, 9b HD Alg, p.16		
13	13	p.169 (4-12) #1-12	ASK VIIIa, 1a VIIIa, 3a		
14	14	pp.171-172 (4-14) #1-20	ASK VIIIa, 2a VIIIa, 4a VIIIb, 2b HD 9-1, p.16		
	15*	pp.179-180 (Ch. Test) #1-12			

*Given at end of Chapter Review Test

Name: _____ Student No.: _____

Period: _____

ALGEB Assignments

Chapter 5

All A assignments are in your text, ALGEBRA A MODERN APPROACH, or on worksheets.

B assignments are from: A PROGRAM in CONTEMPORARY ALGEBRA (PCA).
ALGEBRA SKILLS KIT (ASK).
HAYES DITTOS (HD).

C assignments will be made by your teacher.

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	pp.193-194 (5-1) #2-4	HD 8-1, p.31 Alg, p.2		
2	2	pp.193-194 (5-1) #6 pp.194-195 (5-2) #1-7	HD 8-2, p.8 9-1, p.20		
3	3	p.196 (5-3) #1-16 pp.198-199 (5-4) #1-12 (even)	ALGEBRA A MODERN APPROACH p.198 (5-4) #1-11 (odd)		
4	4	pp.199-200 (5-5) #1,2	See your teacher.		
5	5	p.23 (1-11) #1-12	ASK IVa, 7a #7-14		
6	6	pp.201-202 (5-6) #1,4	ASK IVb, 7b #6-8, 10-12, 14-16		

ALGEB Assigt.
Chapter 5

Block Number	Assigt. Number	A	B	C	Date Completed
7	7	pp.201-202 (5-6) #2,3,5	PCA Book 2, p.78 Frames 27-37		
8	8	p.205 (5-7) #1-33 (odd)	PCA Book 2, p.81 Frames 38-45 60-61 ASK IVa, 2a 1-3, 7-9, 13, 15, 16 HD 9-1, p.25 # 1-7 Alg, p.5 # 1,7,8,10,11		
9	9	p.205 (5-7) #2-34 (even)	ASK IVb, 2b #2,4,6,8,10, 11,13,15,17, 19 HD 9-1, p.24 #1-11 Alg, p.4 #1,2,4,5,9,10, 17,18,20,21		
10	10	p.208, (5-8) #1-35 (odd)	PCA Book 2, p.90 Frames 70-96 HD Alg, p.5 2-6, 9, 12-14 ASK IVa, 3a		
11	11	p.208 (5-8) #2-36 (even)	PCA Book 2, p.97 Frames 99-117 ASK IVa, 5a HD 9-1, p.8 9-1, p.13		

ALGEB Assigt.
Chapter 5

Block Number	Assigt. Number	A	B	C	Date Completed
12	12	p.210 (5-9) #1-29 (odd)	PCA Book 1, p.114 Frames 65-68 ASK IVa, 8a #1-12		
13	13	p.210 (5-9) #2-30 (even)	ASK IVb, 5b		
14	14	pp.211-212 (5-10) #3,4 pp. 214-215 (5-11) #1,3,7,12	See your teacher.		
15	15	pp.214-215 (5-11) #6,9,11,15,17 pp.218-220 (5-12) #2,6,15,17,21, 22,31	No assignment		
16	16	pp.214-215 (5-11) #5,8,18 pp.218-220 (5-12) #1,4,5,8,13, 20,28	No assignment		
17	17	pp.218-220 (5-12) #10,16,18,23, 25,27,29,30	No assignment		
18	18	pp.221-222 #1-12	See your teacher.		

ALGEB Assigt.
Chapter 5

Block Number	Assigt. Number	A	B	C	Date Completed
19	19	pp.223-224 (5-14) #1-15	See your teacher.		
20	20	p.225 (5-15) #1-7	No assignment		
21	21	p.225 (5-15) #8-15	See your teacher.		
22	22	p.226 (5-16) #1-10	ASK IVa,2a #4-6, 10-12, 17, 18 IVb,2b #1,3,5,7,9,12, 14,16,18		
23	23	pp.229-230 (5-17) #1-20	ASK IVa, 9a #1-12		

Name: _____ Student No.: _____

Period: _____

ALGEB Assignments

Chapter 6

Assignments are in your text, ALGEBRA A MODERN APPROACH, or on worksheets.

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	Worksheet 1a	Worksheet 1b		
2	2	Worksheet 2a			
	3	Worksheet 3a	See your teacher.		
3	4	Worksheet 4a	See your teacher.	p.357 (8-4) #4	
4	5	Worksheet 5a	See your teacher.		
5	6	Worksheet 6a			
	7	Worksheet 7a			
	8	Worksheet 8a	No assignment		
6	9	p.366 (8-7) #1-18			
	10	p.367 (8-8) #1-10 Use graph paper: Page A (You need 2 pages) pp.368-369 (8-9) #2	See your teacher.		
7	11	Worksheet 11a	See your teacher.		
8	12	pp.369-371 (8-10) #3a-c, 4a-d, 6,7,14,15	See your teacher.		

ALGEB Assigt.
Chapter 6

Block Number	Assigt. Number	A	B	C	Date Completed
9	13	Worksheet 13a	Worksheet 13b	Read 8.13, pp.374-375 Work p.375 (8-12) #1-5	
	14	Worksheet 14a	See your teacher.		
10	15	Worksheet 15a			
	16	Worksheet 16a			
	17	Worksheet 17a	No assignment		
11	18	p.376 (8-13) #1,2,4,5,7,9, 10 Use graph paper: Page A (You need 2 pages.)	See your teacher.		
12	19	p.385 (8-17) #1-16	See your teacher.	p.385 (8-17) #17-20	
13	20	pp.387-388 (8-14) #1-15	p.387 (8-18) #1-10	pp.387-388 (8-19) #16-20	
14	21	p.389 (8-20) #1-10 p.390 (8-21) #1-10	See your teacher.	p.389 (8-20) #11-15 p.390 (8-21) #11-15	
15	22	pp.392-395 (8-22) #1,2,4,6,10,13, 14,16,17	See your teacher.	pp.392-395 (8-22) #3,5,7,8,9,11, 12,15,18-32	

Note: All C assignments except 13c are not made on-line. They may be assigned to you by your teacher.

Name: _____ Student No.: _____

Period: _____

ALGEB Assignments

Chapter 7

All A assignments are in your text, ALGEBRA A MODERN APPROACH, or on worksheets

B assignments are from: A PROGRAM in CONTEMPORARY ALGEBRA (PCA).
ALGEBRA SKILLS KIT (ASK).
HAYES DITTOS (HD).

C assignments will be made by your teacher.

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	p.247 (6-1) #1-5			
	2	p.247 (6-2) #1a,b,d,e,f,h, i,k; 2a-c	ASK Va,3a Va,4a		
2	3	p.250 (6-3) #1-10			
	4	pp.250-251 (6-4) #1a-h	ASK Va,9a Vb,9b Va,13a		
3	5	p.252 (6-5) #1-8			
	6	p.252 (6-5) #9-15 p.252 (6-6) #1a-f	ASK Va,5a Vb,5b		
4	7	p.255 (6-7) #1a-p	See your teacher.		
	8	p.255 (6-7) #2a-k p.255 (6-8) #1a,b,d,g,h			

ALGEB Assigt.
Chapter 7

Block Number	Assigt. Number	A	B	C	Date Completed
5	9	Worksheet #9	See your teacher.		
6	10	p.258 (6-9)#1; Worksheet #10	See your teacher.		
7	11	p.258 (6-9)#2; Worksheet #11	PCA Book 3, p.97 Frames 5-11		
8	12	Worksheet #12 #1-10, 14-17			
	13	Worksheet #12 #11-13, 18-21	See your teacher.		
9	14	Worksheet #14	PCA Book 3, p.102 Frames 25-28		
10	15	pp.260-261 (6-10) #5-7; 10; 13a,b,d,i			
	16	pp.260-261 (6-10) #1-4; 8; 9; 11; 12; 13c,e-h	PCA Book 3, p.101 Frames 21-24 ASK VIa,1a		
11	17	p.262 (6-12) #1d,f; 2e-h			
	18	p.262 (6-12) #1a,b,c,e; 2a-d; 3; 4	ASK VIa,2a		
12	19	p.270 (6-17) #1-18	ASK VIa,3a		

ALGEB Assigt.
Chapter 7

Block Number	Assigt. Number	A	B	C	Date Completed
13	20	pp.264-265 (6-14) #1,4,6,8,15, 17,21,24-26	ASK VIa,6a #1-9 PCA Book 3, p.110 Frames 61-69		
14	21	pp.264-265 (6-14) #2,3,5,7,9, 10,13,16,18, 22	ASK VIb,6b #4-12 HD 8-2, p.18		
15	22	p.266 (6-15) #1-13,15,16	ASK VIa,4a VIb,4b		
16	23	p.269 (6-16) #1-8, 10-14	ASK VIa,5a VIb,5b PCA Book 3, p.118 Frames 88-108		

Name: _____ Student No.: _____

Period: _____

ALGEB Assignments

Chapter 8

All A assignments are in your text, ALGEBRA A MODERN APPROACH, or on worksheets.

B assignments are from: A PROGRAM in CONTEMPORARY ALGEBRA (PCA).
ALGEBRA SKILLS KIT (ASK).
HAYES DITTOS (HD).

C assignments will be made by your teacher.

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	Worksheet #1	See your teacher.		
2	2	Worksheet #2			
	3	pp.271-272 (6-19) #2-12 (even), 13,15,17,31	ASK VIa,8a VIb,8b PCA Book 3, p.144 Frames 54-57 HD 9-2, p.7		
3	4	p.273 (6-20) #1-19 (odd)			
	5	p.273 (6-20) #4-22 (even)	ASK VIa,7a PCA Book 3, p.158 Frames 113-121		
4	6	p.276 (6-23) #1-16	HD 9-2, p.8 #1-7,11-17		
5	7	p.274 (6-21) #2-10 p.275 (6-22) #2,6,8,10			
	8	p.275 (6-22) #1-11 (odd), 15,17,18	ASK VIa,12a VIb,12b		

ALGEB Assigt.
Chapter 8

Block Number	Assigt. Number	A	B	C	Completed
6	9	p.277 (6-25) #2-20 (even)			
	10	p.277 (6-25) #1-21 (odd)	ASK VIa,13a VIb,13b PCA Book 4, p.3 Frames 12-21		
7	11	p.279 (6-26) #2-18 (even)			
	12	p.279 (6-26) #1-19 (odd)	PCA Book 3, p.150 Frames 73-89 HD 9-2, p.8 #18-24 9-1, p.18 #1-8		
8	13	pp.280-281 (6-27) #2-20 (even)			
	14	pp.280-281 (6-27) #1-19 (odd)			
	15	pp.280-281 (6-27) #20-24	ASK VIa,9a VIa,10a VIb,9b VIb,10b HD 9-2, p.9 #1-22 PCA Book 3, p.154 Frames 91-99		
9	16	p.285 (6-29) #1-8			
	17	p.285 (6-29) #10-26 (even)			

ALGEB Assigt.
Chapter 8

Block Number	Assigt. Number	A	B	C	Date Completed
	18	p.285 (6-29) #9-25 (odd)	ASK VIa,11a		
10	19	Worksheet #19			
	20	p.286 (6-30) #2-12 (even)			
	21	p.286 (6-30) #1-19 (odd)	ASK VIa,14a PCA Book 4, p.6 Frames 24-40		
11	22	p.290 (6-31) #1-23 (odd)			
	23	p.290 (6-31) #2-12 (even), 16,18,22,24,26	PCA Book 4, p.13 Frames 47-71		

Name: _____ Student No.: _____

Period: _____

GENMA Assignments

Chapter 1

Some assignments are from:

ESSENTIALS OF MATHEMATICS, Sobel and Maletsky (EM)
CYCLO-TEACHER

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	Worksheet E1	EM pp.320-321 #1-15		
2	2	Worksheet E2	Cyclo-teacher M-11: Addition Terms		
3	3	Worksheet E3	EM pp.358-361 #1-10		
4	4	Worksheet E4	EM pp.362-363 #1-18		
5	5	Worksheet E5	EM p.363 #19-30		
6	6	Worksheet E6	See your teacher.		
7	7	Worksheet E7	EM p.98 #3,4,6		
8	8	Worksheet E8	EM pp.365-366 #1-11		
9	9	Worksheet E9	EM pp.367-368 Read p.368 #3,4,7,9 p.370 #9-26		

Name: _____ Student No.: _____

Period: _____

GENMA Assignments

Chapter 2

Some assignments are from:

ESSENTIALS OF MATHEMATICS, Sobel and Maletsky (EM)
FILMSTRIPS for SECONDARY MATHEMATICS, Popular Science Set C-5 (FSM)

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	Worksheet N1, N2	EM pp.104-105 #1-5		
2	2	Worksheet N3	EM pp.114-115 #1-14		
3	3	Worksheet N4	Worksheet N4A		
4	4	Worksheet N5	EM p.118 #13-20 p.119 #1-16		
5	5	Worksheet N6	EM pp.131-132 #1-8 p.135 #23-28		
6	6	Worksheet N8, N9	FSM filmstrip #1102		
7	7	Worksheet N7, N10	See your teacher.		
8	8	Worksheet N11 N12	See your teacher.		
9	9	Worksheet N13	EM p.113 #4-23 (without nomograph)		

GENMA Assigt.
Chapter 2

Block Number	Assigt. Number	A	B	C	Date Completed
10	10	Worksheet N14 N15	EM p.120 #29-44		
11	11	Worksheet N16 N17	EM pp.122-123 #1-18		

Name: _____ Student No.: _____

Period: _____

GENMA Assignments

Chapter 3

Some assignments are from:

SELF-TEACHING ARITHMETIC, Scholastic Book Science (STA)

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	Worksheet DW1a	STA Lesson 29-30		
	2	Worksheet DW1			

Name: _____ Student No.: _____

Period: _____

GENMA Assignments

Chapter 4

Some assignments are from:

Educational Projection Corporation (EPC)
SKILLS AND PATTERNS—INDIVIDUALIZING MATHEMATICS, Foley, Bower, and Basten (SP)
ESSENTIALS OF MATHEMATICS, Sobel and Maletsky (EM)

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	Worksheet D1, D2	EPC filmstrip #210 EM pp.144-146 #1-24		
2	2	Worksheet D3	SP (Decimals) pp.1-4 #1-4		
3	3	Worksheet D4	SP (Decimals) pp.7-8 #1-3		
4	4	Worksheet D5	SP (Decimals) pp.10-11 All activities		
5	5	Worksheet D6	EM pp.34-35 #1-21		
6	6	Worksheet D8	SP (Decimals) pp.12-13 #1-3 pp.14-15 #1,4 EPC filmstrip #213		

GENMA Assigt.
Chapter 4

Block Number	Assigt. Number	A	B	C	Date Completed
7	7	Worksheet D9	SP (Decimals) pp.16-17 #1-3 EM p.354 #31-40		
8	8	Worksheet D10	SP (Decimals) p.20 #1-12 pp.22-23 All activities EPC filmstrip #214		
9	9	Worksheet D11	SP (Decimals) p.25 #1-8 pp.27-28 #1-2 EPC filmstrip #215		
10	10	Worksheet Di2	SP (Decimals) p.29 #1-2		

Name: _____ Student No.: _____

Period: _____

GENMA Assignments

Chapter 5

Some assignments are from:

SKILLS AND PATTERNS—INDIVIDUALIZING MATHEMATICS (SP)
"Fraction's—Addition and Subtraction," Foley, Smith, and Basten (Fractions I)
"Fraction's—Multiplication and Division," Foley, Jacobs, and Smith (Fractions II)

ESSENTIALS OF MATHEMATICS, Sobel and Maletsky (EM)

Educational Projection Corporation (EPC)

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	Worksheet R1	SP (Fractions I) pp.1-2 All activities		
2	2	Worksheet R2	EM pp.194-196 #1-29		
3	3	Worksheet R3	EM pp.298-300 #1-23		
4	4	Worksheet R4	SP (Fractions II) pp.3-5 All activities		
5	5	Worksheet R5	SP (Fractions II) pp.1-2 All activities		
6	6	Worksheet R6	SP (Fractions I) p.4 Read pp.6-7, #1-5		
7	7	Worksheet R7 R8	SP (Fractions I) pp.14-15,18 All activities EM pp.301-304 #1-29		

GENMA Assigt.
Chapter 5

Block Number	Assigt. Number	A	B	C	Date Completed
8	8	Worksheet R9	SP (Fractions I) pp.16-17 #1-3 p.19, #1-2		
9	9	Worksheet R10	SP (Fractions I) pp.20-22 All activities		
10	10	Worksheet R11 R12 R13 R14	SP (Fractions I) pp.23-27 All activities		
11	11	Worksheet R15	SP (Fractions I) pp.28-30 All activities		
12	12	Worksheet R16	SP (Fractions II) pp.16-17 All activities EM pp.305-306 #1-17		
13	13	Worksheet R17	SP (Fractions II) pp.12-15 All activities		
14	14	Worksheet R18	SP (Fractions II) pp.18-20 All activities		
15	15	Worksheet R19	SP (Fractions II) pp.21-25 All activities		
16	16	Worksheet R20	SP (Fractions II) pp.26-29 All activities EM pp.307-308 #21-33		

GENMA Assigt.
Chapter 5

Block Number	Assigt. Number	A	B	C	Date Completed
17	17	Worksheet R21	EPC filmstrip #211		
18	18	Worksheet R22	EPC filmstrip #212		

Name: _____ Student No.: _____

Period: _____

GENMA Assignments

Chapter 6

Some assignments are from:

SKILLS AND PATTERNS—INDIVIDUALIZING MATHEMATICS (SP)
"Fractions—Addition and Subtraction," Foley, Smith, and Basten (Fractions I)

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	Worksheet RP1 RP2	See your teacher.		
2	2	Worksheet RP3	SP (Fractions I) p.3 #1-10		
3	3	Worksheet RP4	See your teacher.		
4	4	Worksheet RP5	See your teacher.		
5	5	Worksheet RP6	See your teacher.		
6	6	Worksheet RP7	No assignment.		
7	7	Worksheet RP8	No assignment.		

Name: _____ Student No.: _____

Period: _____

GENMA Assignments

Chapter 7

Some assignments are from:

ESSENTIALS OF MATHEMATICS, Sobel and Maletsky (EM)

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	Worksheet P1	EM pp.309-310 #1-15		
2	2	Worksheet P2	EM pp.292-293 #1-6,19-20		
3	3	Worksheet P3	EM pp.292-293 #7-14		
4	4	Worksheet P4	EM p.311 #16-24		
5	5	Worksheet P5	EM p.294 #21-30		
6	6	Worksheet P6	See your teacher.		
7	7	Worksheet P7	EM pp.462-463 #1-15		
8	8	Worksheet P8	EM pp.463 (bottom), 464 #21-30		
9	9	Worksheet P9	EM p.463 #16-20		

Name: _____ Student No.: _____

Period: _____

GENMA Assignments

Chapter 8

Some assignments are from:

FILMSTRIPS FOR SECONDARY MATHEMATICS, Popular Science Set C-6 (FSM)
ESSENTIALS OF MATHEMATICS, Sobel and Maletsky (EM).

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	Worksheet F1	FSM filmstrip #1109		
2	2	Worksheet F2	See your teacher.		
3	3	Worksheet F3	FSM filmstrip #1103		
4	4	Worksheet F4	EM pp.345-347 #1-8		
5	5	Worksheet F5	See your teacher.		

Name: _____ Student No.: _____

Period: _____

GENMA Assignments

Chapter 9

Some assignments are from:

ESSENTIALS OF MATHEMATICS, Sobel and Maletsky (EM).
MATHEMATICS CONCEPTS APPLICATIONS (MCA).

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	MCA pp.506-508	EM pp.162 ,170-176		
2	2	Worksheet GA1	No assignment		
3	3	Worksheet GA2	EM pp.289-290		
4	4	Worksheet GA3	Worksheet GA4		
5	5	Worksheet GA5	Worksheet GA6		
6	6	Worksheet GA7	No assignment.		
7	7	Worksheet GB1	Worksheet GB2		
8	8	Worksheet GB3	EM p.208 bottom p.212, #6-11	Worksheet GB4	
9	9	Worksheet GB5	Worksheet GB6		
10	10	Worksheet GB7	Worksheet GB8		
11	11	Worksheet GB9	Worksheet GB10		
12	12	Worksheet GB11	No assignment.		
	13	Worksheet GB12			
	14	Worksheet GB13			

Name: _____ Student No.: _____

Period: _____

GENMA Assignments

Chapter 10

Some assignments are from:

ESSENTIALS OF MATHEMATICS, Sobel and Malesky (EM).

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	EM pp.200-205 All exercises	No assignment.		
2	2	Worksheet M1	No assignment.		
3	3	Worksheet M2	No assignment.		
	4	EM pp.220-223 All exercises	No assignment.		
4	5	Alberta Worksheet "Area of a Triangle" Use the drawing of the worksheet instead of the pegboard mentioned. parts 1-9; parts 10-12 optional	No assignment.		
5	6	Worksheet M3	No assignment.		
6	7	Alberta Worksheet "Area of a Rectangle" Use the drawing of the worksheet instead of the cardboard squares mentioned. Parts 1-5	No assignment.		

GENMA Assigt.
Chapter 10

Block Number	Assigt. Number	A	B	C	Date Completed
7	8	Worksheet M4	No assignment.		
8	9	Worksheet M5	No assignment.		
	10	Alberta Worksheet "Volume of Rectangular Solid and Pyramid" parts 1-3; problems on pyramids, optional; omit part 1, #2	No assignment.		
9	11	Alberta Worksheet "Circumfrence of a Circle"; parts 4-6	No assignment.		
	12	Alberta Worksheet "Area of a Circle" Use a compass or any circular object to draw the circles instead of the wooden and plastic discs mentioned. parts 1,3-5	No assignment.		
	optional assignment: Worksheet M6				
10	13	Worksheet M7	No assignment.		
	14	Worksheet M8	No assignment.		
11	15	Worksheet M9	No assignment.		
	16	Worksheet M10	No assignment.		

Name: _____ Student No.: _____

Period: _____

GENMA Assignments

Chapter 11

Block Number	Assigt. Number	A	B	C	Date Completed
1	1	Worksheet PL1	No assignment.		
2	2	Worksheet PL2	No assignment.		
3	3	Worksheet PL3	No assignment.		
4	4	Worksheet PL4	No assignment.		
5	5	Worksheet PL5	See your teacher.		
6	6	Worksheet PL6			
7	7	Worksheet PL7			
8		No Assignment			
9	8	Worksheet PL8	See your teacher.		
10	9	Worksheet PL9	See your teacher.		
11	10	Worksheet PL10	See your teacher.		
12	11	Worksheet PL11	See your teacher.		
13	12	Worksheet PL12	See your teacher.		

CHAPTER IV
SPECIAL ROUTINES

The following routines have been developed for special purposes in the Coursewriter program. They are unique to the Consortium CAI program.

ON routine

This routine initializes and updates the counters, switches, return registers and buffers used to acquire data for the Student Performance Summary for each day's on-line activity (one or more sign-on's). Each time the student signs on the program, the on routine is executed first.

The skip routine is accessed from the on routine as described in the GENERAL OPERATING PROCEDURES (Appendix A).

Note: If a student is signed-off with message code 41 (label not found in return register) just after he signs on, it is likely that the error is generated from the branch to return register 1 executed at the end of the on routine. The PRESS to access the skip routine is executed before the branch instruction. It can be used to "skip" the student around the branch. The label displayed by the skip routine is the invalid label causing the error. The correct version of the label should be typed in the skip routine.

SKIP routine

This routine permits immediate access to any label within the course segment being executed. (By accessing the label "trans," the program is transferred to the next logical course segment. By accessing the label "begin," the program is transferred to the course index.) The skip routine identifies the current course segment* and the last executed major label*. It allows for entry of a comment* and then the desired label*. When this label is entered, the program resumes execution at that label. A proctor message containing the starred items is sent.

Procedures for accessing and using the skip routine are described in the GENERAL OPERATING PROCEDURES. This routine should not be available for student use.

OFF routine

This routine processes data accumulated during time on-line for the Student Performance Summary and is accessed by initiating the sign-off procedure for student mode as described in the GENERAL OPERATING PROCEDURES. For this routine to be executed, it is absolutely essential that the student use correct sign-off procedures. If the Off routine is not executed, incorrect information will be given in the SPS report for the "guilty" student. The most important errors that may be incurred by incorrect sign-off procedures are: incorrect information given for block number and assignments, and in appropriate label used for restart point.

The Skip routine may be accessed from the Off routine as described in the GENERAL OPERATING PROCEDURES.

OPTION routine

If a student fails to meet criterion on an out-quiz, he is presented the DECISION TABLE which gives him the option to review any part of the instructional materials (instruction, practice, summary) covered by the out-quiz or to sign-off. If the student takes the option to sign-off, he will begin at the DECISION TABLE when he signs on again.

While executing his option, the student can return to the DECISION TABLE at any time by initiating sign-off procedures. If the student reviews all the material in his option, he is automatically branched back to the DECISION TABLE. In either case, the DECISION TABLE will then contain the out-quiz as an additional option. (See Flowchart, Appendix E.2)

STUDENT PERFORMANCE SUMMARY

The Student Performance Summary (SPS) is a computer program that extracts data that has been stored for each student in the disk files. The information provided by SPS is designed to assist teachers in monitoring student progress and managing the CAI classroom.

The SPS program can only be executed when students are not on-line. It should be run as soon as possible after all students in a course are finished for the day so that the information can be made available to teachers for planning the next day's activities.

Note: If the Off routine described earlier is not properly executed, data for SPS will be lost.

Student Performance Summary

COURSE -- GENMA SECTION -- 1 TIME -- 15/07 DATE -- 10/14/1970

STUDENT NAME	NUM	SEG	SCT.BK	LABEL	DAILY TIME**	LAST TIME**	CUML TIME	PRESKL TEST* **	PRE TEST* **	OUT QUIZ* **	ASSIGNMENT* **	CHAPT TEST	ATTEND ON-LINE
JOHN STURDIVANT	sljs	1	01.01	e00010	0	0	34					0	1
JOHN JONES	sljj	2	01.01	n00010	28	28	320	99	0	3		0	14
MARY ADAMS	slma	20	05.05	n00240	15	15	348	99	-1	1	5a	0	21
ALICE ARBECK	slaa	22	09.09	n00650	25	25	285	99	0	2	1b	0	18
SAM TARRIS	slst	22	11.11	n00770	18	10	325	99	1	1	10a, 11a	0	20
SALLY HAIRE	slsh	29	CH2CHT	CT02	30	30	380	0	0	0		75	20
TOM DORMAN	sltd	4	05.05	d00090	20	5	300	99	0	0	5a	0	14

Code	Column	Interpretation
99	PRESKIL, PRETEST, OUT QUIZ	No test
0	PRESKL	Began test but did not finish.
1	PRESKL	Missed at least 1 question on test.
-1	PRETEST	Test available but option not taken.
0	PRETEST	Criterion not met on test.
1	PRETEST	Criterion met on test.
0	OUT QUIZ	Began test but did not finish.
1,2,3	OUT QUIZ	Number of times out quiz was completed.

*These do not apply when a Chapter Review Test or a Chapter Test is taken.

**These items are set to zero each time SPS is run.

Interpretation of Headings in the Student Performance Summary

Heading	Interpretation
STUDENT NAME	Student name
NUM	Student number
SEG	Course segment number
SCT.BK*	Section and block number These numbers will be the same in genma. In algeb, section refers to the section number in the original version of the course.
LABEL	Last major label encountered during execution of the program
DAILY TIME**	The total time, in minutes, of the daily terminal session or sessions.
LAST TIME**	If a student has signed on more than once per period this column indicates the length of time, in minutes, of the last session.
CUML TIME	The cummulative time, in minutes, on the course.
PRESKL TEST**	Preskills test for one or more instructional blocks.
PRE TEST**	Pretest for one or more instructional blocks.
OUT QUIZ**	Criterion quiz for an instructional block.
ASSIGNMENT**	Specifies off line activity associated with an instructional block.
CHAPT TEST	Percent correct on a chapter test.
ATTEND ON-LINE	Number of days a student has been signed on the course.

*Chapter Review Test or Chapter Test identified in this column.

**These items are set to zero each time SPS is run.

See documentation of SPS for explanation of sorting.

On-line Chapter Test

Tests have been developed for on-line administration at the end of each chapter for each course. (The one exception is Chapter 3 in general mathematics.) The test items parallel the format and content of questions presented in the instructional portion of the program, and the on-line quizzes. The chapter tests should be viewed as criterion tests for the chapters. If a student's preformance is unsatisfactory, the areas of difficulty may be identified by the teacher and remedial activities prescribed.

Each chapter test consists of a series of pools of test items. Test items are representative questions from the various blocks in a chapter. Items from one or more blocks are stored in a pool. Not all items in a pool are to be presented to the student taking the test. For example, there may be five test items from the first block of a chapter in an item pool, but the student would receive only three of the items. The Coursewriter program randomly selects items from the pool and presents them in a random order. The probability of the same test items being presented in the same sequence by the program is greatly reduced by using this technique.

The student is provided with three options as each item is presented. The student may respond to the item, skip to the next item, or return to a previously presented item. If the student elects to redo an item, after a response is made to that item, the program will return to the last item presented. The student is given no knowledge of results during the execution of the test. At the end of the test, the student may return to a previously presented item, having the skipped items presented again, or have his score displayed.

Each item in the pool is identified by an alphanumeric code. The alphabetic character identifies the section pool, the number character is the number of the item within a section pool. For example, c2 identifies the item as the second question in section pool c. A printed copy of each chapter test is available to the teacher. The items in the test are identified by the alphanumeric code.

At the end of the test a proctor message is printed out at a typewriter terminal giving a summary of the student's performance, a list of the alphanumeric code of the students test questions and an indication below each question of his performance on that item. (See Figure 1.)

```
station 04 slrt genma proctor message
test          cor          pbm       %        min
ct04            6           10       60         6
**b4c1a5a1c4b3a3c2b5
***   b a     -
```

test - identifies the test

cor - the number of questions responded to correctly

pbm - the total number of problems presented

% - (cor/pbm) x 100

min - the time on test, in minutes

The flagged items are interpreted as follows:

* - indicates an incorrect keyboard response to item b4

b - indicates the incorrect selection from a multiple choice item, a5, by light pen

a - indicates the incorrect selection from a multiple choice item, a1, by light pen

- - indicates item a3 was skipped

Figure 1. Proctor message of a student's performance for one terminal session.

In this example, the teacher can determine that the student has missed the items from section a. Further instruction on the material for section a could be provided and the student retested.

Review Questions in Chapter Tests

Each chapter test after chapter 1 has approximately five review questions* which cover the material learned in previous chapters. As the name indicates, the purpose of these questions is review.

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*These review questions are not to be confused with the review test which is a randomly generated test of items which parallel the chapter test. The review test is given the day before the chapter test.

After the student has completed the chapter test, and has been given his score, he is told that he is to answer several review questions. He is given the option of doing them immediately or the next day when he signs on again. Depending on his choice, the student is either given the review questions and then signed off or given the message that he will do the questions the next day and signed off.

Each student gets the same review questions in the same order. Unlike the chapter-test questions, the student is given the correct answers if he answers incorrectly. At the end of the review the student is told how many questions he has answered correctly. This score is not stored or combined in any way with the regular chapter-test score.

For programing convenience, the coding of the review questions has been placed in the segment containing the chapter-test (after the test questions) and in the first segment of the following chapter (after the on routine). A switch is used to control course flow so the student receives the questions only once.

Review Chapter Test

A review of the instructional material, in the form of a preview of the forthcoming chapter test, is provided at the end of each chapter. (The one exception is Chapter 3 in the general mathematics course.) The items in the Review Chapter Test parallel selected samples from the item pools in the corresponding Chapter Test.

At the completion of the Review Chapter Test, students are signed off. The program does not permit students to sign on the Chapter Test the same day that the Review Chapter Test was taken. The reason for the delay is to provide students with an opportunity to review prior to taking the Chapter Test. It is also unlikely that both tests could be completed in one class period.

When a student is signed off, a proctor message similar to the one for a Chapter Test is delivered to the typewriter terminal. A printed copy of the Review Chapter Test enables areas of difficulty to be identified and review materials to be assigned. It is recommended that students do the assigned work prior to taking the Chapter Test.

Course Index

Course segments ALGEB - Ø and GENMA - Ø contain indices of the respective courses. A Course Index may be accessed from any segment in the course by using the SKIP routine (see Appendix A).

Each Course Index provides three options: 1) access to an index of the chapters, 2) access to an index of course segments ordered by chapter, 3) direct access to a course segment.

Chapter index. The user may see a complete list of chapter topics and/or access the segment index of the chapter of his choice. Access of the segment index is by a light pen response.

Segment index. The user may see a complete list of the course segments within each chapter and/or access a course segment. The segment index includes the segment numbers and the topics of course content included in the segments. A course segment is accessed by a light pen response.

Direct access. If the user knows the number of a desired course segment without referring to an index, the segment may be accessed by entering the appropriate number.

APPENDIX A

INSTRUCTIONAL STATION GENERAL TERMINAL PROCEDURES

APPENDIX A

INSTRUCTIONAL STATION
GENERAL TERMINAL PROCEDURES

ATTENTION*	Operation:	1. press and hold ALTN CODING key 2. press INDEX key
	Purpose:	1. to gain control of the keyboard to type a command 2. to cause the course to pause
CHARACTER-ERASE	Operation:	1. press and hold ALTN CODING key 2. press BACKSPACE KEY until cursor (□) is in the desired position
	Purpose:	to erase one or more typed characters
ENTER	Operation:	1. press and hold ALTN CODING key 2. press SPACE BAR
	Purpose:	1. to indicate the end of a response or a command 2. to cause the course to continue after an ATTENTION pause
INDEX	Operation:	press INDEX kay
	Purpose:	to move the cursor (□) down one half-line for each press of the INDEX key
PRESS	Operation:	press the SPACE BAR
	Purpose:	permits the course to continue
REVERSE INDEX	Operation:	press REV INDEX key
	Purpose:	to move the cursor (□) up one half-line for each press of the REV INDEX key
SIGN-ON	Operation:	1. ATTENTION(ALTN CODING and INDEX simultaneously) 2. type: on (space) course name/author (or student) number 3. ENTER (ALTN CODING and SPACE BAR simultaneously)
	Purpose:	to sign on a CAI course

*Do not make this procedure available to the student.

SIGN-OFF

Author Mode*	Operation:	1. ATTENTION (ALTN CODING and INDEX simultaneously) 2. Type: off** 3. ENTER (ALTN CODING and SPACE BAR simultaneously)
Student Mode	Operation:	1. One of the following: a. In DECISION TABLE: choose "off" option b. Any other light pen response: point to P in lower right corner of screen c. Keyboard response: type ALTN CODING q 2. Press SPACE BAR when PRESS appears on screen.
	Purpose:	To sign-off or terminate on instructional session

SKIP ROUTINE***

1. Accessible from
   a. Off routine
      1. Initiate sign-off procedure (Type ALTN CODING q, point light pen to P in the lower right corner of screen, or choose "off" option in DECISION TABLE)
      2. PRESS appears in lower right corner of screen.
      3. Although no cursor appears on the screen, type ALTN CODING p.
      4. If SPACE BAR is pressed (instead of typing ALTN CODING p), the program will continue through the off routine
   b. On routine (Student executes on routine each time he signs on.)
      1. Screen is cleared and PRESS appears in lower right corner of screen.
      2. Although no cursor appears on the screen, type ALTN CODING p.
      3. If SPACE BAR is pressed, the program will continue to the student's restart point.

---

*This procedure should not be made available to the student. Student use of this procedure will result in incorrect data on SPS.
**This may be changed periodically by the system's operator to prevent student use of this procedure.
***The skip routine should not be made available to the student.

2. Text displayed on screen

   a. Present course segment
   b. Last executed major label

3. Type comment

   a. Approximately 50 characters are available for comments
   b. If no comment, just ENTER.

4. Type label to access material in

   a. Current course segment - type label and enter
   b. Next logical course segment - type "trans" and enter
   c. Any other segment by means of the course index - type "begin" and enter

   NOTE: If an invalid label is entered, an error message 41 (label not found in return register) will be generated and the terminal will be signed-off. When the student is signed back on, execution will begin in the skip routine.

APPENDIX B

RECOMMENDED OFF-LINE CURRICULUM MATERIALS

Printed Materials

Item	Source
A Collection of Cross Number Puzzles	J. Weston Walch
Algebra (dittos)	Hayes School Publishing Co., Inc.
Algebra A Modern Approach, 2nd. Ed.	D. VanNostrand Corp.
Algebra Can Be Fun	J. Weston Walch
Algebra Skills Kit	Science Research Associates, Inc.
Amusements in Mathematics	LaPine Scientific
Common Fractions	Lafayette Parish Schools
Conversion of Measures	Lafayette Parish Schools
Decimal Fractions	Lafayette Parish Schools
Discovery and Structure Series	Addison-Wesley Publishing Co.
Enlarging Math Ideas	Ginn and Company
Essentials of Math, Skills and Concepts	Ginn and Company
Eureka Booklet	Creative Publications
Experiences in Mathematics Discovery Booklets 1, 2, 3, 5	National Council of Teachers of Mathematics
Experiments in Mathematics Stage 1, 2, 3	Houghton Mifflin Co.
Exploring Math Ideas	Ginn and Company
Extending Math Ideas	Ginn and Company
Exploring Mathematics on your Own (series) Topology, Finite Mathematical Systems, Adventures in Graphing, Number Patterns, Basic Concepts of Vectors, The World of Measurement, The World of Statistics, Probability and Chance, Logic and Reasoning in Mathematics	Webster Publishing Co.
Fantasia Mathematics	LaPine Scientific
From Zero to Infinity	LaPine Scientific
Fun with Mathematics	LaPine Scientific
Games for Learning Math	J. Weston Walch
Geoboard Geometry	Cuisenaire Company
Geometry Can Be Fun	J. Weston Walch
Getting a Line on Math	Cuisenaire Company
Graphing Math Sentences	Ginn and Company
How Children Fail	Cuisenaire Company
How Children Learn	Cuisenaire Company
How to Teach Math in Secondary Schools	Saunders Teaching Series
Informal Geometry	Lafayette Parish Schools
Introduction to Algebra	Lafayette Parish Schools
Introduction to Math Sentences	Ginn and Company
Introduction to Optical Illusions	J. Weston Walch

Item	Source
Laboratory Manual for Elementary Mathematics	Prindle, Weber and Schmidt, Inc.
LAMP (Low Achiever Motivational Project)	Des Moines Public Schools
Let's Go Out to Eat	Lafayette Parish Schools
Math Photo Quiz	J. Weston Walch
Math Puzzles and Pastimes	LaPine Scientific
Math-with Numbers in Color "A" & "B"	Cuisenaire Company
Mathematical Bingo	J. Weston Walch
Mathematical Puzzles	LaPine Scientific
Mathematics Classroom Library	Charles E. Merrill Co.
Mathematics Illustrated Dictionary	Cuisenaire Company
Mathematics, Its Content, Method, Meaning	American Math Society
Mathematics: Man's Key to Progress Book A, B	Franklin Publishers, Inc.
Matrices I	Houghton Mifflin Company
Measures of Central Tendency	Educational System Development
Measures of Dispersion	Educational System Development
Men of Mathematics	LaPine Scientific
Mits, Wits, and Logic	LaPine Scientific
Modern Mathematics (dittos)	
Grade 7, Book 1, 2	
Grade 8, Book 1, 2	
Grade 9, Book 1, 2	Hayes School Publishing Co., Inc.
Notes on Geoboards	Cuisenaire Company
Number Principles and Patterns	Ginn and Company
Number Sentences	Lafayette Parish Schools
100 Mathematical Curiosities	J. Weston Walch
Operations with Whole Numbers	Lafayette Parish Schools
Opportunities in Mathematics	J. Weston Walch
Optical Illusions	J. Weston Walch
Other Bases in Arithmetic	Ginn and Company
Patterns and Discovery Series	Addison-Wesley Publishing Co.
Patterns and Puzzles in Mathematics	Franklin Publishers, Inc.
Per Cent	Lafayette Parish Schools
Presentation of Data	Educational System Development
Probability and Statistics	Charles E. Merrill Company
Program for Mathematically Underdeveloped Pupils	Palm Beach County, Florida
A Program in Contemporary Algebra, Revised Edition, Books 1-5	Holt, Rinehart, and Winston
Ratio and Proportion	Lafayette Parish Schools
Riddles in Mathematics	LaPine Scientific
Self Teaching Arithmetic	Scholastic Books
Sets in Geometry	Ginn and Company
Skills and Patterns Series	Addison-Wesley Publishing Co.
Survey Test of Algebraic Aptitude	California Test Bureau
30 Projects for Math Clubs	J. Weston Walch
The Education of T. C. Mits	LaPine Scientific
The Great Mathematicians	LaPine Scientific

Item	Source
The Math Wizard	J. Weston Walch
What is Modern Math?	J. Weston Walch
Whole Numbers--Factors	Lafayette Parish Schools
Worksheet Pads--40 exercises	Cuisenaire Company
Yes, Mathematics Can Be Fun!	J. Weston Walch

OFF-LINE CURRICULUM MATERIALS

Manipulative Materials

Item	Source
Celluloid pocket rules	LaPine Scinetific
Centimeter Decimal Set and Strip	H & M Associates
Checkline	Creative Publications
Counting Frame	Kurtz Brothers
Cuisenaire rods	Cuisenaire Company
Cyclo Teacher	Field Educational Publications
Decimal Fraction Dominoes	Responsive Environments Corp.
Equations	Wff'n Proof
Fraction Dominoes	Responsive Environments Corp.
Geoboard	Cuisenaire Company
Heads Up	E. S. Iowe
Kalah	Creative Publications
Kount-N-Kube	Creative Publications
Lego (gears 001)	Learning Materials Division
Nice Cubes	Cuisenaire Company
Numble	Selchow & Righter Company
ON·SETS	Wff'n Proof
Plastic Mathematical Balance	H & M Associates
Psychepaths	Cuisenaire Company
REAL numbers game	Wff'n Proof
Sage Kit	LaPine Scientific
Space Spiders	LaPine Scientific
Tac-Tickle	Wff'n Proof
Tri Nim	E. S. Iowe
Tuf	Cuisenaire Company
WFF	Wff'n Proof
Wff'n Proof	Cuisenaire Company

OFF-LINE CURRICULUM MATERIALS

Filmstrips

Item	Source
Addition and Subtraction of Decimals	Educational Projection Corporation
Bar Graphs Comparison	Educational Projection Corporation
Building Concepts in Math	Imperial Film Company
Circle Graphs Relationships	Educational Projection Corporation
Comparing Fractions	Educational Projection Corporation
Discovering Solids w/records	Imperial Film Company
Division of Decimals	Educational Projection Corporation
Expressing Common Fractions	Educational Projection Corporation
Formulas and Functions	Popular Science
Inequalities	Popular Science
Introducing Decimal Notations	Educational Projection Corporation
Introducing Percent	Educational Projection Corporation
Introduction to Graphs	Educational Projection Corporation
Line Graphs-Trends	Educational Projection Corporation
Measurement of Angles and Arcs	Popular Science
More Problems in Percent	Educational Projection Corporation
Multiplication of Decimals	Educational Projection Corporation
Operations: Polynomials & Fractions	Popular Science
Parallel Lines and Parallelograms	Popular Science
Picture Graphs Counting	Educational Projection Corporation
Postulates in Algebra	Popular Science
Problem Solving I	Popular Science
Problem Solving II	Popular Science
Series	Popular Science
Signed Numbers	Popular Science
Solving Equations	Popular Science
Solving Problems in Percent	Educational Projection Corporation
Studying Triangles	Popular Science
Two Linear Equations	Popular Science
Miscellaneous	Popular Science
An Introduction to Coordinate Geometry	
An Introduction to Probability	
How a Computer Solves a Problem	
Indirect Measurement Tangent Ratio	
Introduction to Irrational Numbers	
Mean Proportion and Right Triangles	
Nature of Roots of Quadratic Equations	
Points, Lines and Planes	
Rearrangement Theorem of Addition	
Sum of the Measures of Angles of a Triangle	
The Slope of a Line	
Truth Tables	

APPENDIX C

ALGEBRA OFF-LINE PROGRAM

Algebra Off-Line Program

Purpose

The purpose of the off-line program is to better meet the learning needs of each student in the Consortium CAI Algeb and Genma courses. The off-line program should:

1. Provide some remedial help for students who are having difficulty with the on-line program. This will be a more critical problem as the pupil/teacher ratio in the classroom increases.

2. Allow the better students to progress through the course more rapidly. This might be accomplished by the study off-line of some topics which occur on-line later in the course. The possibility of studying later topics earlier is evidenced by the different order in which textbook authors present various topics.

3. Provide the opportunity for some students to look at some topics in greater depth. For example, the study of many of the properties of equality, multiplication, addition, etc., seems trivial to students when applied to sets of whole numbers, integers and real numbers. Sometimes they develop a better understanding of these properties by examining systems which do not have these properties.

4. Promote the students' enjoyment of and appreciation for the study of mathematics. In recent years some excellent material has been developed to introduce such topics as probability, matrices, topology, number theory and others to high school students on a level which they can readily comprehend. Many of these presentations are intriguing and novel. For the student who has been working hard week after week with the on-line program, a short look at these could be a refreshing change.

5. Provide a readily available, useful activity for any time the student could not go ahead on his regular work. This might occur if he has difficulty at a time when the teacher is busy or if he is ready to go on line and a terminal is not available.

Types of off-line material (Algeb)

The off-line material can be separated into two basic categories: remedial work for those having difficulty and extra work for those progressing without difficulty.

There are three sources of help in the remedial area: the SRA Algebra Skills Kit, the Hayes ditto material, and the series of programed texts, A Program in Contemporary Algebra. The two former sources are mainly for additional practice. These resources will be correlated with the on-line material by chapter and block.

The extra work can be classified as additional topics (AT), in depth (ID), acceleration (LA), and games and puzzles (GP). Most of this material is in the form of pamphlets or work books. Some of the suggested activities are small "experiments" or games. The programed text will be used for acceleration activities as well as remedial. By studying some topics off-line, the student may be able to pass the pretest on the topic and thus move ahead on-line to new materials.

Filing off-line activity assignments

The remedial activities which are correlated directly with the on-line material will be listed on assignment sheets to be kept in a notebook. The assignments will be made by the on-line program if a student misses an out quiz two times.

The extra activities are written on 5 x 8 cards which will be filed. Each card contains the source of the activity (booklet name, etc.), a sentence or two describing the activity, and chapter or page references (where appropriate). In addition, in the upper right hand corner of the card is a code to indicate the nature of the activity (AT, ID, LA, or GP), the chapter which should be completed before the activity is attempted (if there is a prerequisite), and a reading level coded *, **, ***, (***being the most difficult level of reading).

Implementing the off-line program (General)

In order for the off-line program to work efficiently, the student must be instructed in its usage early in the school year. If he knows what is available and where it is located he should be able to proceed on his own

when the teacher is working with other students. These activities are not meant to replace individual student/teacher interaction but to conserve on teacher resources.

When a student fails an out quiz, he is presented with four options: instruction, practice, summary, or off. For some it will be sufficient to simply repeat one, or part of one, of the first three choices. Other students may opt to repeat the entire instructional block.

If this review work is not adequate, the student may choose to sign off and see the teacher with questions or look in his notebook for remedial work. More practice with the Skills Kit, or additional explanations in the programed text may be sufficient to solve his problem. This provides the student with a useful instructional activity at times when several other students may be waiting to see the teacher.

At other times, students may be signed off to do an assignment and may not be able to sign on again when the assignment is completed because all the terminals are in use. In order not to waste time, he could choose an activity from the card file which would allow him to move ahead faster, to look at a topic in depth, etc.

There may also be times when the fastest students are ahead of schedule and would like, for a change, to look at some of the additional topics off-line: he could work on this for one or more periods and then return to his on-line work. (These additional topic activities will be used only in the latter part of the year when the student is sufficiently far along that we can be assured that he will cover the necessary material.)

In order for this program to be effective, there are several prerequisites.

Since this type of activity may be new to the students, they will need to have it explained to them carefully and be closely supervised at the start of the school year. They must understand that this is an important, integral part of the program, not just an added frill.

The package of off-line material which has been developed thus far is only a start. Many other excellent sources are available and can be added because of the flexibility of the card file. Filmstrips are one of the possible additions. It is hoped that the teachers will make suggestions for additional materials as useful activities are discovered in the classroom.

APPENDIX D
REMAT AND DRILL

Two programs were developed to supplement the algebra and general mathematics courses. These supplemental programs were designed to provide drill and practice through mathematical games and drill exercises. Entry is governed by students' registering for remat. An index at the beginning of the remat program provides access to the various exercises in the remat and drill course segment. The use of the ALTN CODING q or selection of p with the light pen will return the program to the index. To sign off, the "off" option in the index should be selected in order to obtain available proctor messages.

Remat

The remat course segment contains Tic-Tac-Toe, Algebra Drill, Estimation Game and Multiplication Drill.

Tic-Tac-Toe. The original game has been modified to incorporate drill with arithmetic operations. Two players take turns in marking a cell by pointing with the light pen to the desired cell. When a cell has been selected by a player, a problem is displayed on the screen. If the correct answer is given, the selected cell is marked by a X or O, whichever is appropriate. If an incorrect answer is given, the cell is not marked and the second player takes his turn. The sequence is repeated until all cells are marked. The winner or a draw is declared on the screen by the program.

The numbers for the problems are randomly generated. There is no limit to the number of games that may be played. No record is maintained of the number of games won by a player.

Estimation Game. This game was designed to provide practice in estimating the product of two whole numbers, each in the range $0 \leq n < 100$. The game aspect of the program is provided by a target with four concentric square rings. When a problem is posed, the target appears on the screen of the CRT. The closeness of response to the correct answer determines which ring is "lit up." An answer within 1/16 of the correct answer scores a bull's eye; 1/8 is indicated by the second ring; 1/4 is indicated by the third ring; 1/2 is indicated by the fourth ring. A response that deviates by more than 1/2 of the correct answer misses the target.

As an added motivational device, a score is generated that is dependent on the accuracy of the response and how quickly the response is made. Four points are scored for a bull's eye, three points for the second ring, two points for the third ring and one point for the fourth ring. In addition, 20 points are scored if the response is within one second. A time-point is lost for every second required to respond. For example, a perfect score of a bull's eye within one second is 4 + 20 = 24 points. A "hit" in the outer ring with a response time of 5.4 seconds would be 1 + (20 - 5) = 16 points. The score is multiplied by 100 to provide a large number and is displayed to the student.

A total score is kept for each student. After twenty problems his score is compared with his previous high score for twenty problems, then a new set of problems is started. Essentially, the student is playing the game against himself since scores between sets of problems are compared.

The scoring on a combination of time and accuracy forces the student to answer quickly in order to get a high score. The purpose of the game is to motivate students to estimate an answer, therefore, "educated guesses" are encouraged.

Algebra Drill. This program provides problems of the type $j + 3 = 10$ or $7k + 10 = 80$. The variables and constants are randomly generated. The program may be considered an enriched drill since the algorithm for solving a problem is demonstrated if two incorrect answers are given. The feedback for incorrect answers is described below.

Problem: Solve the following.

$7k + 10 = 80$

1st incorrect answer feedback:

Check your answer. Try again.

2nd incorrect answer feedback:

Add -10 to both sides of the equation.
The resulting equation is
$7k + 10 + (-10) = 80 + (-10)$
which then becomes

$$7k = 70$$

Divide both sides by 7 to get

$$k = 10$$

Multiplication Drill. This program is a timed drill on the multiplication of integers which are randomly generated. Different levels of problems provide a challenge to the student to increase his proficiency by moving to more difficult levels containing problems with larger numbers and shorter time limits. The integers range from -99 to 99. Time limits range from 1.5 seconds to 7.0 seconds.

Drill

The drill course segment contains programs on: a) whole numbers operations, b) integers operations, c) a version of the Estimation game (Acu-Rate) utilizing the four arithmetic operations, d) inequalities between whole numbers, e) decimals and fractions, and f) reducing fractions.

An index at the beginning of the course segment permits access to the various programs in the segment.

Whole Number Operations. Drill-1 is an untimed mathematics drill in the addition, subtraction, multiplication, and division of positive integers. Addition contains 7 levels; subtraction, 6; multiplication, 7; and division, 6. The problems, which are randomly generated, become more difficult as the levels increase.

When the student signs on he will select an operation. The student will begin at the lowest level within that operation and will continue until he completes all levels or until he signs off. He will go to the next higher level when he correctly answers 5 randomly-generated problems in succession. If he misses one problem his score will go back to zero but he will remain on the same level. After receiving two new problems he will have another attempt at the problem he answered incorrectly. If he answers two problems in succession incorrectly he will return to the next lower level.

The proctor message will tell if the student completes all levels within an operation or if he signs off. The proctor message will also give the operation he was in, the last level he completed, the amount of time spent on the operation and the student's number.

Integers Operations. Drill-2 is an untimed mathematics drill in the addition, subtraction, multiplication and division of positive and negative integers. The levels and value limits are identical to Drill-1. The only

difference between Drills 1 and 2 is that in Drill-2, levels 5 and up in each operation will contain both positive and negative integers. Drill-1 contains only positive integers.

Proctor messages are the same as in Drill-1.

Acu-Rate. Drill-3 is a version of the Estimation game. While estimation contains problems requiring the estimation of the product of two numbers whose ranges are $-99 > n < 99$, Acu-Rate is a set of problems which use one of the four arithmetic operations that is selected.

Inequalities. Drill-4 is a drill on relationships using whole numbers, decimals and fractions.

The student uses the light pen to point to the sign in the answer set that will indicate the relationship between the randomly generated numbers.

The following indicates the levels, the minimum and maximum values of the numbers to be randomly generated and the signs from which the student will choose. The box indicates where the missing sign is to be inserted.

Level	Problem	Answer Set
1	(0 - 10)* □ (0 - 10)	< = >
2	(0 - 50) □ (0 - 50)	< = >
3	(0 - 1000) □ (0 - 1000)	< = >
4	(0 - 5) + (0 - 5) □ (0 - 10)	< = >
5	(0 - 10) □ (0 - 5) + (0 - 5)	< = >
6	(0 - 5) + (0 - 5) □ (0 - 5) + (0 - 5)	< = >
7	(1 - 10) □ (1 - 10)	= ≠
8	(1 - 10) □ (1 - 10)	≤ ≥
9	(.000 - .999) □ (.000 - .999)	< = >
10	$\frac{1}{(1 - 10)}$ □ $\frac{1}{(1 - 10)}$	< = >
11	$\frac{(1 - 10)}{(1 - 10)}$ □ $\frac{(1 - 10)}{(1 - 10)}$	< = >
12	$\frac{(1 \div 10)}{(1 - 10)}$ □ $\frac{(1 \div 10)}{(1 - 10)}$	< = >

*The numbers in parentheses indicate the minimum and maximum numbers that will be generated.

Inequalities (Drill-4) continued

Level	Problem	Answer Set
13	$\frac{(1 - 10)}{(1 - 10)} \square \frac{(1 - 10)}{(1 - 10)}$	< = >
14	$(1 - 5) \square \frac{(1 - 10)}{(1 - 10)}$ or $\frac{(1 - 10)}{(1 - 10)} \square (1 - 5)$	< = >
15	$a = (1 - 10)$ $b = (1 - 10)$ a $\square$ b	< = >

The scoring of Drill-4 will be by the same method used in Drill 1 and Drill-2, i.e., the student must answer 5 problems in succession correctly to move to a more difficult level. The score will drop to zero when one problem is missed. When two problems in succession are answered incorrectly the student will go back one level.

Proctor messages indicate whether the student has signed off or completed Drill-4. If he signs off the proctor message indicates this, gives the drill number (Drill-4) and his present level.

Fractions. Drill-5 contains exercises in reducing fractions to their lowest terms: adding, subtracting, multiplying and dividing fractions; changing mixed numbers to improper fractions: and multiplying whole numbers by fractions. The student must express all answers in least common terms.

The program contains fifteen levels. The student signs on at the lowest level and continues until he completes all levels or until he signs off. As before, the student must answer correctly 5 problems in succession to go to the next higher level. If he answers 2 problems in a row incorrectly he will go back to the next lower level.

Proctor messages will tell if the student signs off or if he completes all levels in Drill-5. If the student signs off before completing Drill-5 the proctor message will indicate the name of the drill (fractions), the number of the drill (Drill-5), and his present level.

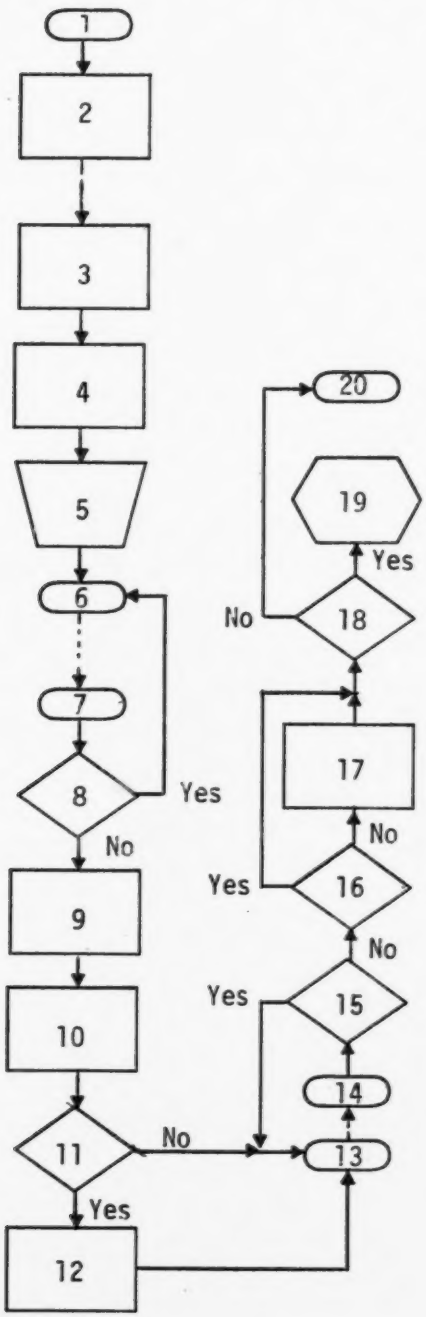
APPENDIX E

FLOWCHARTS

Key to Flowchart - Organization of a Chapter

1. From introduction to terminal procedures or from previous chapter.
2. Block 1.
3. Block n.
4. Chapter Review Test.
5. Student performance reported.
6. Signed off.
7. Signed on.
8. Chapter Review Test and Chapter Test the same day? If yes, go to 6. If no, go to 9.
9. Chapter Test.
10. Student performance reported.
11. Want review question same day as Chapter Test? If yes, go to 12. If no, go to 13.
12. Review questions of previous chapters.
13. Signed off.
14. Signed on.
15. Chapter Test and next chapter the same day? If yes, go to 13. If no, go to 16.
16. Review questions answered? If yes, go to 18. If no, go to 17.
17. Review questions on previous chapter.
18. Teacher option: Should student review portions of chapter? If yes, go to 19. If no, go to 20.
19. Skip routine to access blocks within chapter.
20. Next chapter.

APPENDIX E.1
ORGANIZATION OF A CHAPTER



Key to Flowchart - Organization of an Instructional Block

1. Preskills test on block(s).*
2. Criterion met? If yes, go to 4. If no, go to 3.
3. Remedial and/or review.
4. Option to take pretest. If yes, go to 5. If no, go to 8.
5. Pretest on block(s).*
6. Criterion met? If yes, go to 7. If no, go to 8.
7. Next block not covered by pretest.
8. Instructional material (See Appendix E.3).
9. Off-line assignment mode.
10. Out-quiz on block(s).*
11. Criterion met? If yes, go to 12. If no, go to 13.
12. Next instructional block or chapter review test.
13. Number of iterations of out-quiz. If 1st iteration (A), go to 17. If 2nd iteration (B), go to 15. If 3rd iteration (C), go to 14.
14. Teacher informed of third failure of out-quiz. Go to 12.
15. Teacher informed. May assign additional off-line activity. If yes, go to 16. If no, go to 17.
16. Teacher assigns off-line material.
17. **Option routine. Go to 8 or 10. (Student's options)

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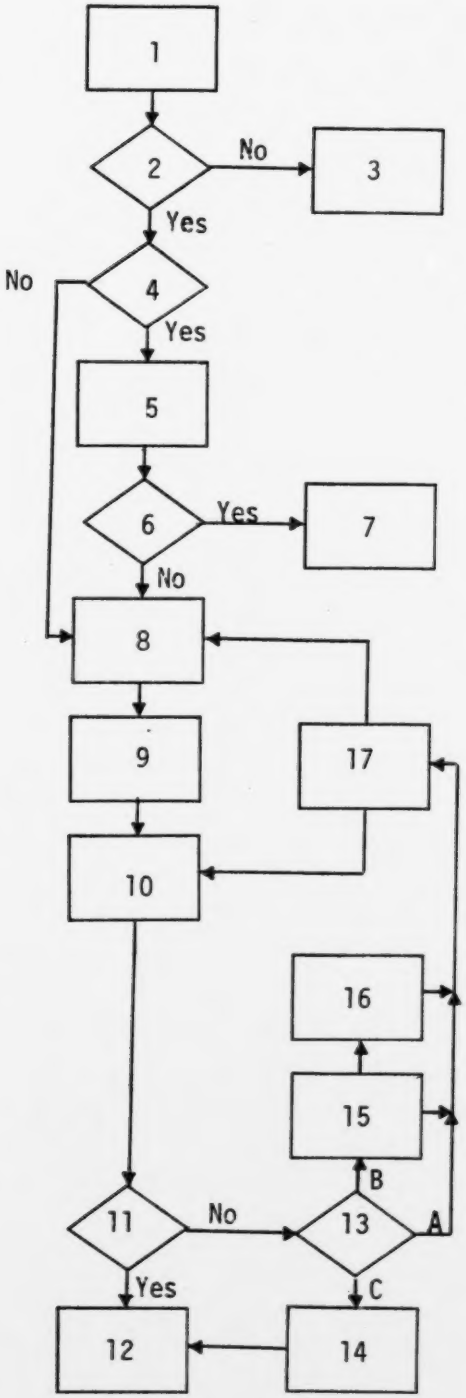
*Any one or more of these may not exist for a given block.
**Only executed after first iteration of block.

APPENDIX E.2

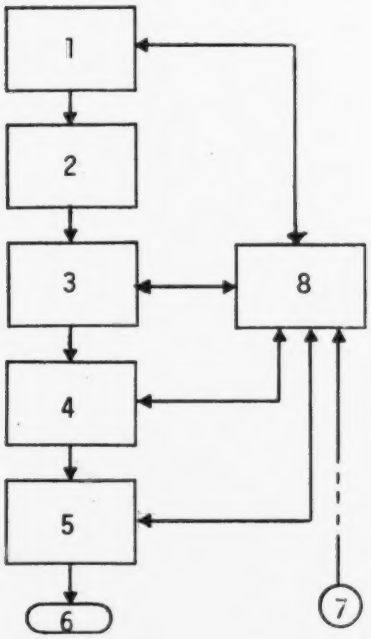
ORGANIZATION OF INSTRUCTIONAL BLOCK



Key to Flowchart - Instructional Material

1. Instruction frames. (Topic 1)
2. Assignment loaded.
3. Practice frames. (Topic 1)
4. Instruction and practice frames. (Topic 2)
5. Summary frames.
6. Sign off.
7. Failure to meet out-quiz criterion.
8. Options routine to access components of instructional material.

APPENDIX E.3
INSTRUCTIONAL MATERIAL



APPENDIX F

GLOSSARY OF TERMS

ALGEB - The name of the computer program for the Consortium algebra course.

ASSIGNMENTS - There are three general classes of assignments:

1. A assignments will be made by the on-line program to all students who have completed an initial instruction block.
2. B assignments will be made by the on-line program to those students who have not met criterion on the second administration of the out-quiz.
3. C, D assignments will be made by the teacher. There are two categories of C assignments:
    a. Remedial
    b. Enrichment or acceleration

AUTHOR MODE - A mode that allows the user to construct a Coursewriter program or modify an existing Coursewriter program.

AUTHOR NUMBER - A code used (when signing on a course) that accesses the author mode.

BLOCK - A subdivision of a chapter in the on-line instructional material based on topic and time needed to complete the material.

BRANCHING - Sending the student through different paths of instructional material. These paths are determined by his responses. Not all students follow the same path.

CHAPTER - A division of the instructional material similar to that in a text book.

COUNTER - A programing device used to store numerical data such as the number of correct and incorrect responses. Counters are used to accumulate the data for the student performance summary.

COURSE SEGMENT - A division of a Coursewriter course. A course division independent of the instructional material. A chapter of instructional material may include several course segments.

CRT - (Cathode Ray Tube) the television-like display screen of the 1510 terminal.

CURSOR - A symbol (□) on the CRT that indicates where the character to be entered from the keyboard will be placed.

DECISION TABLE - An index presented to the student on the CRT when an out-quiz is failed one or two times. The index permits the student to access subsections of the current block.

ENTER - Procedure for ending a keyboard response.

ERROR MESSAGE - A message delivered to the typewriter terminal indicating an error in the Coursewriter program. The error is indentified by a number.

Example: Station 10 S103 algeb message code 40

FEEDBACK - The reply to a student's response. Depending on the students response this reply may be a figurative "pat on the back," a hint to help him answer correctly, or a simple statement such as "Correct" or "Incorrect."

GENMA - The name of the computer program for the Consortium general math course.

IBM 1500 SYSTEM - A computer system dedicated to CAI. It consists of: 1131 central processing unit, 1502 station control, 1510 CRT terminals, 1512 image projector, 1518 typewriter terminal. A more detailed description of the system may be found in "IBM 1500 System Summary."

IMAGE PROJECTOR - A projection device using a film strip mounted on a cartridge to show individual images. The Coursewriter program controls the presentation of the images. Images are sometimes called displays.

INSTRUCTION - The material in the block which presents the concepts. This may include explanation and questions.

INSTRUCTIONAL STATION - Synonymous with TERMINAL.

INVALID LABEL - A label called by the program or entered at the terminal that is not found in the current course segment.

KEYBOARD - The typewriter keys on the 1510 terminal. It is used to respond when "K" appears in the lower right corner of the CRT.

LABEL - A particular address within the Coursewriter program. A label may consist of a maximum of six alphabetic or numeric characters.

LIGHT PEN - The pen-like device located on the right side of the CRT. It is used to respond when a "P" appears in the lower right hand corner of the CRT. To use it, point to the desired response area of the CRT and press.

LISTING - A printed copy of the Coursewriter statements for a Coursewriter program.

MAJOR LABEL - A label assigned immediately preceeding a prr. In general, a prr is assigned at the beginning of each instructional frame.

OFF-LINE MATERIAL - Instructional material not presented at a CAI terminal.

Examples: books, pamphlets, filmstrips, games

ON-LINE MATERIAL - Instructional material presented at a CAI terminal.

OFF-LINE TIME - Instructional time not at the terminal.

ON-LINE TIME - Instructional time at the terminal.

OP CODE - Two-letter identifier designating the action to be taken by the computer.

PRACTICE - Material which contains questions that provide practice with the concepts presented in the instruction.

PRINTOUT - Printed copy produced at the 1518 typewriter terminal. Error messages, proctor messages, and course listings may be obtained as printouts.

PROCTOR MESSAGE - A message sent to a terminal designated as the proctor station to provide information about a student's performance. Normally this will be the 1518 typewriter. Each proctor message is preceeded by originating (student) terminal number, the student's identification number, and the course name.

PRR - (PROBLEM RESTART POINT) - An op code indicating the point at which a student will resume work when he signs on the next lesson. Generally, this will be a point in the instructional program preceeding the point where the student signed off, thus providing some repetition of the original instruction.

REMEDIAL - Additional instruction for students having difficulty. Frequently it presents the concept in a different manner from the original instruction.

STUDENT MODE - A mode that limits the user to the execution of a Coursewriter program.

STUDENT NUMBER - A four-character number assigned to each student that accesses the student mode. The student performance record is identified by this number. This number must be used by a student when he signs on a course. The characters of the student number are interpreted as:

1st. character--Alphabetical character from 1 to z used to subdivide a section for roster purposes.

2nd. character--Numerical character, 1 thru 9, to represent the class period.

3rd. and 4th. characters--Student's initials or other identifying characters. If student's initials are used, improvisation may be necessary to avoid duplication.

SUMMARY - Text and questions designed to summarize the content presented in the instruction.

STUDENT PERFORMANCE SUMMARY - A summary of the student's performance delivered as a proctor message when the student signs off.

TERMINAL - The Cathode Ray Tube (CRT), the keyboard, the light pen, and the image projector are collectively called a terminal. Synonym: Instructional Station.